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ABSTRACT

This annual serial volume contains 16 articles offering practical pedagogical ideas from faculty at New Hampshire technical colleges. Following prefatory matter, the following articles are presented: (1) "The Pleasantwood Project: Teaching Science and the Humanities in a Scenario-Based Learning Environment," by Doyle Davis; (2) "Self-Paced, Self-Directed Study as a Teaching Methodology in a Nursing Assistant Program," by Susan J. Henderson; (3) "A Classroom Experiment: The Effect of Incorporating Learning Styles Strategies Upon the Teaching of Introductory Chemistry," by Perry Seagroves; (4) "Definition of the Technical Problem Solving Process," by Lafayette J. Harbison; (5) "A Sparrow Doesn't Live in a PC," by Tom Gorka; (6) "Transition Writing," by Bill Warnken; (7) "Creating a Student Centered Learning Environment," by Jackie Griswold; (8) "What Teaching Psychology Students Has Taught Me About Teaching Students," by Sandy Cole; (9) "The Student in the Middle," by Diane Chin; (10) "Assessing Student Participation Using Performance Criteria," by Paul Marashio; (11) "What Determines a Student's Final Exam Score in a Principles of Economics Class?" by Ronald W. Olive; (12) "Students as Course Designers," by Nancy Marashio; (13) "To Dream the Impossible Dream," by Janice G. Kaliski; (14) Beyond the Book," by Denise S. and Tyler S. St. Cyr; (15) "Building the Global Initiative: Leadership Towards a Barrierless World of One Community," by Marjorie Goodson; and (16) "A Pedagogy Blueprint for the 21st Century: Pedagogy and Assessment Implications of 'Using Voluntary National Skill Standards in Performance Based Curriculum Design,'" by the New Hampshire Community Technical College System Pedagogy Committee. (ECF)

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Volume 4 1997

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"Wisdom is not wisdom when it is derived from books alone."

Horace

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PEDAGOGY JOURNAL

New Hampshire Community
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In Dedication: Jeff Rafn

The Genesis of the "Pedagogy Journal" is Commissioner Jeff Rafn's vision statement presenting to faculty and administration a compass whose needle pointed the NHCTC System in the direction of the 21st Century. Within this vision Jeff floated the idea of a System scholarly journal dedicated to wide ranging ideas and issues. On hearing the call, the Pedagogy Committee latched on to the idea of a journal and formally requested the Journal for Pedagogy. With Jeff's verbal commitment backed by his financial commitment the first volume of the "Pedagogy Journal" appeared at the October 1994 System Symposium.

The "Pedagogy Journal" is a forum to encourage faculty to test Pedagogy's shifting paradigm from teaching to learning and to share those teaching - learning experiences.

With the groundswell of positive accolades from system faculty and administration and with high praise from national pedagogy and professional associations, the "Pedagogy Journal" has become an annual system fixture.

The "Pedagogy Journal" as change agent trumpeting the strength of the NHCTC system - pedagogy - is one of Jeff's significant and enduring legacies as he heads north to Green Bay, Wisconsin.

To show our gratitude, the Pedagogy Committee takes the unprecedented action of dedicating volume 4 of the "Pedagogy Journal" to our Commissioner H. Jeffrey Rafn.

PREFACE
Change Agents As Risk Takers

Paul Marashio
Chair, Pedagogy Committee

Change demands a mentally tough change agent. Often the change agents are risk-takers living on the edge with omnipresent failure hanging out close-by, ready to pounce at the slightest misstep.

What brings on these changes? Dissatisfaction with the status quo is one of the major motivators for change. Many faculty are convinced students can learn even better when new and innovative teaching approaches are designed and implemented. This year's authors have developed better pedagogical ways of engaging students in learning and also in intensifying academic rigor. These changes range from an overhaul of the curriculum/pedagogy: the virtual workplace, ADN self-paced curriculum, physics and the world of work, chemistry and learning styles, and the literature of the Sarah Josepha Hale Award winners to the less dramatic, yet significant changes: problem-solving, assessing student participation, scenario based learning, leadership building and teaching students to write transition sentences. One contributor even writes of her angst when her mother enrolled in the author's English course.

Even though the writers are fully aware of failure's presence, their undaunted confidence is evident. The reader senses that the practitioners know they will not fail, and that if by happenstance failure makes an unexpected visit to their classrooms, they will brush themselves off, pick up the debris and move on to another exciting pedagogy idea. It is the thrill of success - observing students learn and grow in intellect - that drives the change agent to introduce new pedagogy ideas. Through their pedagogical successes every author uncovered a better way to help students learn.

As with previous "Pedagogy Journal" articles, we encourage you to try out any idea that appeals to you. Also, we encourage you to contact the authors - see contributor's addresses, phone numbers and email addresses at the end of the journal - if you have questions and/or a desire to share ideas.

The Pedagogy Committee enthusiastically thanks the contributors for making volume 4 of the "Pedagogy Journal" a success and for continuing to bind the system into an even stronger, prouder college community. Our deepest appreciation to Commissioner H. Jeffrey Rafn, who supported and

encouraged the "Pedagogy Journal" both through words and deeds (see the dedication). A special thank you to Scott Westover whose professional expertise and guidance contribute to the Journal's touch of class. To the Pedagogy Committee, specifically the editorial board, my heartfelt gratitude for your tireless efforts in making the "Pedagogy Journal" a reality and a success.

CONTENTS

Pages

IN DEDICATION
H. Jeffrey Rafn

PREFACE
Paul Marashio

THE PLEASANTWOOD PROJECT: TEACHING SCIENCE AND THE HUMANITIES IN A SCENARIO-BASED LEARNING ENVIRONMENT 1
Doyle Davis

SELF-PACED, SELF-DIRECTED STUDY AS A TEACHING METHODOLOGY IN A NURSING ASSISTANT PROGRAM 9
Susan J. Henderson

A CLASSROOM EXPERIMENT: THE EFFECT OF INCORPORATING LEARNING STYLES STRATEGIES UPON THE TEACHING OF INTRODUCTORY CHEMISTRY 21
Perry Seagroves

DEFINITION OF THE TECHNICAL PROBLEM SOLVING PROCESS 29
Lafayette J. Harbison

A SPARROW DOESN'T LIVE IN A PC 33
Tom Gorka

TRANSITION WRITING 35
Bill Warnken

CREATING A STUDENT CENTERED LEARNING ENVIRONMENT 41
Jackie Griswold

WHAT TEACHING PSYCHOLOGY HAS TAUGHT ME ABOUT TEACHING STUDENTS 47
Sandy Cole

THE STUDENT IN THE MIDDLE 55
Diane Chin

ASSESSING STUDENT PARTICIPATION USING PERFORMANCE CRITERIA 63
Paul Marashio

WHAT DETERMINES A STUDENT'S FINAL EXAM SCORE IN A PRINCIPLES OF ECONOMICS CLASS? 69
Ronald W. Olive

STUDENTS AS COURSE DESIGNERS 73
Nancy Marashio with Steven Bohrer, Brent Bradley, Lynn Patrequin, Diana Wyman and Barbara Holden Yeomans

TO DREAM THE IMPOSSIBLE DREAM 85
Janice G. Kaliski

BEYOND THE BOOK 97
Denise S. and Tyler S. St. Cyr

BUILDING THE GLOBAL INITIATIVE: LEADERSHIP TOWARD A BARRIERLESS WORLD OF ONE COMMUNITY 105
Marjorie Goodson

A PEDAGOGY BLUEPRINT FOR THE 21st CENTURY: PEDAGOGY AND ASSESSMENT IMPLICATIONS OF "USING VOLUNTARY NATIONAL SKILL STANDARDS IN PERFORMANCE BASED CURRICULUM DESIGN" 109
Pedagogy Committee

AUTHORS 149

THE PLEASANTWOOD PROJECT

Doyle V. Davis, Ph.D.

Teaching Science and the Humanities in a Scenario-Based Learning Environment

The purpose of this paper is to describe a teaching strategy which has been used by the author and has seen increasing acceptance among faculty of the NHCTC system as an alternative to the standard lecture format. It uses a constructivist approach in which students create their own paths of learning in a scenario-based format. There are strong elements of curiosity, challenge, and fantasy as students explore the virtual community of Pleasantwood which struggles to embrace its need for economic growth while preserving its past.

Overview:

The author is the chief design specialist for a CD-ROM scenario-based learning environment in which students play the role of technicians working for a company which is moving its coal-fired manufacturing facility from an urban environment to the rural community of Pleasantwood . Students must decide which of three potential sites in Pleasantwood will be the best compromise between the needs of the company and the concerns of the community. Working in groups of four, students must gather information, allocate resources, make compromises, and reach a decision based on a weighted matrix of factors affecting the relocation of the company. Each team then must give a formal presentation to their teacher and other science faculty who play the role of the CEO and the board of governors of the company. The goal of the project is to teach students that technicians in today's high performance workplace must understand the social, political, economic, and environmental factors which can affect the decision and policy making process of their employers.

Why Develop this Module? - The SCANS Report

One of the major results of the Secretary's Commission on Achieving Necessary Skills (SCANS) report was that employers felt that students should be able to: **"Understand and Describe the Larger Social, Political, Economic, and Business Systems in which the Employee and the**

Firm Must Function". This is an important skill which is not addressed in most science courses taught in today's two-year technical and community colleges - especially physics.

The idea of teaching children and adults through some type of scenario or game-based learning process is not new. With the explosive development of interactive multimedia technologies, authoring systems, and high speed microprocessors, teachers are now able to offer students non-linear learning experiences with multiple branching points which more accurately represent the way information is gathered in today's high performance workplace.

While two year community/technical colleges have done a good job in giving their graduates the technical skills needed to succeed in the high-performance workplace, evidence from interviews with employers in business and industry suggest that these graduates have received little training or experience in understanding the broader social, political, and economic factors which drive the decision making processes of these companies. In this module, students will learn that in addition to the skills they will acquire in their technology field, they also will discover how social, political, and economic factors can influence the way in which they function in the high performance workplace.

What Students Learn

The project is designed to create a learning situation in which students work in teams and learn to allocate resources, acquire and evaluate information, and reach a decision which will require them to negotiate and compromise. To maximize their success in this module, students should have already taken an English composition or Technical Writing course. In addition to these communication skills, they should have a firm foundation in algebra and trigonometry. This is one of the reasons why the decision was made to introduce the module into a physics course in the second semester where many of the communication, computer, and math skills would have been covered in earlier courses.

Setting the Stage

Evad Corporation, a company located in a major urban and manufacturing center wants to relocate its precision castings division to Pleasantwood, a small town located in a rural section of a state where the major source of revenue has been tourism since its last major business, a lumber mill was forced to close due to competition and a recession in the

economy. The company has successfully negotiated with the mayor and city council of the town, and agreements have been signed which make the move to Pleasantwood attractive to both the company and the town. Evad Manufacturing can sell its current urban facility and real estate for a good profit. It can then reinvest the income from the sale into a modern highly efficient coal-fired manufacturing facility in a region of the state where land is cheaper, average hourly wages are lower, and tax advantages for the company are higher.

Town Officials Welcome the Move

Town officials welcome the move. It will bring increased tax revenues, provide for more than 200 new full-time jobs, and pump money into a business economy which for more than a decade has depended primarily on its lakes and mountains to support tourism.

Not Everyone is Pleased!

After examining a number of possibilities for the location of the new plant, company and town officials have narrowed the list to three final choices. However, not everyone in the town is pleased about this. Some citizens of the town are concerned that the construction of a facility which is going to burn coal as part of its manufacturing process may have a detrimental effect on the town including: lowering the quality of the air ; reducing real estate values of property near the plant; reducing tourism; and possibly damaging historic buildings and monuments in the area.

The Assignment to the Student

In this module, students play the role of a company team working for the Evad Corporation. The students must gather information about the three proposed sites for building the facility and reach a decision on which of the sites will be the best compromise between the needs of the company and the desires of the community. The students must consider carefully both the pros and cons for each of the sites. This must be done from the points of view of the company and the community. In this module, the students learn how to create a *weighted* ***decision matrix*** in order to evaluate each site.

By working their way through a self-paced tutorial, the students learn the meteorological factors which determine how the pollutants in a smoke plume can spread. In addition, the students use some special software tools developed for this module which let them set various parameters including wind speed, wind direction, the rate at which pollution is emitted from

the smoke stack, the height of the stack, the location of the stack and the type of atmospheric stability for the conditions they wish to model. Once the students have chosen the conditions, they create a "virtual plume" and see how it will spread over the town of Pleasantwood.

In addition to these modeling and simulation tools, we have created a spreadsheet which has been developed to model a very complex formula which describes the spread (dispersion) of the smoke plume from the stack. By changing the values of quantities in the various cells of the spreadsheet, they are able to quickly visualize the behavior of the plume under different conditions. The ability to draw conclusions from the testing of models is an important skill which employers in advanced technology fields are urgently seeking. Figure 1 shows the result of using the modeling software.

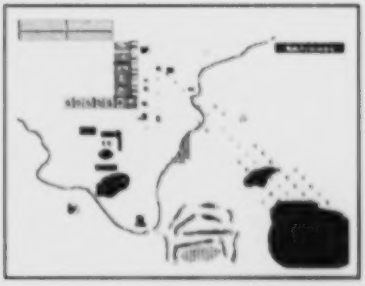

Figure 1: **Plume Analysis Tool:** Students have chosen a wind from the NW and an inversion as the current air stability index. Plot shows that plume will spread over the retirement village at the lake and reach the ski area

The Role of the Teacher

In scenario-based learning environments, the teacher has a difficult role. The teacher must be very careful to avoid "painting tracks on the floor" for the students to follow. It is tempting for instructors to create "To Do" lists which outline tasks students must accomplish often in some preferred order. While it is important that the overall goals and objectives of the learning experience are clearly defined, it is also equally important that the learning experience be open-ended enough to encourage independent thought and actions. Generally this type of learning process begins with the entire class meeting with the instructor to receive a general overview of the learning module, its purpose, goals, and objectives.

Students are shown a brief overview of the module, how to start the application, how to use the basic components of the software, what resources are available via the software as well as external sources such as the WWW and reading lists. Time lines are discussed, as well as, how the project will be graded. Part of the grade includes a peer review process in which each member of the team rates his/her fellow team mates. Students

are asked to think about who they would like to work with in a team (maximum of four students) before the next class. Since the project is given in the second semester of the science course most students already know each other from this and other classes. Most teams are formed by the next class.

Some teachers will argue that this is not the best way to form a team. This may be true. At least for the current beta testing of this model, we have let the students form their own teams. (Note: The course does not need to be a physics course. It could be an environmental science course where students already have taken physics.) The importance of a team working together with each member "pulling his/her weight" is discussed as well as what can happen when a member of the team does not contribute and fulfill his/her responsibilities.

Students are then released to explore the module at the computers. Figure 2 shows the instructor (at left) moving among the students discussing aspects of the module. The students are in the "exploratory phase" at this point and are just becoming familiar with the software. The job of the teacher at this point is to step back and answer questions only when called upon.

Figure 2: Exploring the Software

The Fun Begins!

The real fun begins during the next class or lab. (Note: most instructors find the two/three hour block of lab time to be better suited for this type of learning.) The teacher asks each team to begin the process of exploring the three proposed sites for the location of the plant and building a matrix of decision factors which will ultimately determine their final choice. The instructor must be careful to avoid any negative or positive reference to each site. It is the job of the student teams to make such decisions. The role of the teacher now shifts to an "observer" or "manager" of the teams. He/she must watch as the students begin their deliberations and track their progress. Knowing when to intervene and to back off is critical at this point. It is interesting to watch how certain individuals will emerge as the leaders of a team. Questions like: "Don't you think we should do this first?" or " Who wants to do this while I do this?" are often heard from such

"spontaneous leaders". At other times, the teacher must step in and make suggestions like "I think you should stop exploring the software now and get together as a group to begin looking at your decision factors"

You know, I never thought of that!

For many of us who entered the teaching profession too many years ago to remember (or want to remember), the idea of letting students "manage" their own learning can be frightening. Many of us teach the way we were taught which in most cases was the lecture method. The element of control is lost as students break the bonds of the traditional lecture format and start asking questions for which the teacher's only answer may be: "You know, I never thought of that!" But herein lies the excitement of letting students construct their own learning path. Figure 3 shows a student team posing a question to the teacher off camera. A consultation begins as shown in Figure 4. During this critical phase, the teacher (physics professor, Paul Jozik of Hagerstown Junior College), must avoid the temptation to supply the "right answer". In fact, there may be no right answer. The softwa:e may not include the necessary information to answer the question. As with many real world problems, decisions often must be made with limited or missing information . Assumptions rule in place of hard facts. In their final reports, students are asked to list all assumptions made in reaching their final decision.

Figure 3: "Hey Mr. J, We've got a problem!"

Figure 4: Consultation in progress

Teacher, Teachers!

The module is rich in content and ripe for team teaching with another science or humanities instructor. There are strong social issues at play in the module. The main employer in the town, a lumber mill, has closed and people are out of work. People need jobs yet some fear the factory with its smoke stack will damage tourism which is the main source of revenue for Pleasantwood. Health issues are also an important concern to citizens

of Pleasantwood who fear the pollution from the coal-burning plant may harm not only historical monuments in the town but also create respiratory problems.

The course could be team taught by a physics and biology/ anatomy - physiology instructor. For example, the biology instructor might come in at certain times to discuss the effects of pollution such as low-level ozone and/or sulfate aerosols on lung tissue. Figure 5 shows the author (standing at left) and Professor Paul Jozik (behind students) facilitating a discussion among a student team. The concept of a "visiting expert" such as an atmospheric physicist or environmental engineer who could add a real world perspective to the project is currently being explored.

As the course progressed over the next three weeks, the students often worked at other times besides the standard lab. Some students had their own computers at home and asked for a copy of the software to install on their own PC. Copies were given to all who asked. The software was installed on computers throughout the campus including the learning center and library as well as the science wing.

Figure 5: Team Teaching with Colleagues or Visiting Experts

The students had begun the project on March 26. On May 1, each student team submitted a written report to the class and gave an oral presentation defending the site they chose. To add a touch of realism to the project, Professor Jozik played the role of the CEO of the company. Several of his colleagues in the science department joined in the scenario by playing members of the board of governors of the company. Each report had its own personality and reflected the uniqueness of its authors and their path of learning.

To the surprise and delight of the author and Professor Jozik, the student teams developed modes of analysis in their determination of the best location for the coal-fired power plant which had not been imagined by the instructors. This most likely would not have happened if the instructors had "painted the footprints on the floor" and given the students a step by step procedure for arriving at their choice. The results of the alpha testing seem to have supported the claims of another champion of scenario-based learning:

No compulsory learning can remain in the soul... In teaching children, train them by a kind of game, and you will be able to see more clearly the natural bent of each. **(Plato, The Republic, Book VII)**

Acknowledgments...

The author would like to express his deep appreciation to Professor Paul Jozik and his physics students at Hagerstown Junior College, Hagerstown, MD, for their pioneering efforts in the alpha testing of this module. The photographs in this paper were taken by the author at HJC during the initial field testing (alpha version) of the module. Based on feedback from Professor Jozik and his students, a beta version is being developed which will be tested by several teachers in the New Hampshire Community Technical College System during the 1997-98 academic year.

During the academic year, 1997-98 teams of physics teachers from Hagerstown Junior College (Hagerstown, MA), Northern Essex Community College (Haverhill, MA), South Seattle Community College (Seattle,WA) and Modesto Jr. College (Modesto, CA) who have assisted the author in the development of the project will test the module in the second semester of a standard physics course (both calculus and non-calculus based). The module will also be tested by Indian River Community College in Ft. Pierce, Florida and the Northwest Center for Emerging Technologies in Bellevue, Washington. The project is supported in part by National Science Foundation (#DUE-9553664) *Associate Degree for Manufacturing Technicians*, Arnold Packer and Elisabeth Mathias, Co-PIs.▼

SELF-PACED, SELF-DIRECTED STUDY AS A TEACHING METHODOLOGY IN A NURSING ASSISTANT PROGRAM

Susan J. Henderson, Ed.D

Changes that are occurring in the health care industry are being reflected in downsizing and restructuring of agencies, changes in staff skill mix, changes in role and function of health care workers, and increased use of unlicensed assistive personnel and nursing assistants. These trends have also impacted the local health care agencies. It has become clear that one of the ways in which these agencies are responding to cost containment is through the increased use of the licensed nursing assistant. However, some agencies are looking for the multiskilled, cross-trained nursing assistant.

In assessing the current nursing assistant (NA) course offered at NHCTC, it became apparent that there were four concerns about the NA course that focus on accessibility, scheduling, changing role of the nursing assistant, and meeting the needs of non-traditional adult learners enrolled in the course.

First, accessibility to the course is limited. One of the factors limiting accessibility is that applicants are not eligible for financial assistance. Most of them have great difficulty financing the cost of a course as they are socioeconomically disadvantaged. Unless they can find a sponsor, they do not enroll.

A second factor limiting accessibility is that the course is not offered on a regular basis. When it is offered, the inflexible semester schedule does not meet the needs of the adult learner. The traditional lecture methodology requires that the learner participate in the learning experience when it is convenient for the college.

The third concern is that the NA course does not reflect the new role and job expectations of nursing assistant personnel. Some employers are now expecting that NAs have cross-training in clerical skills as well as the basic NA skills.

A fourth concern is that the current course does not meet the needs of the adult learner. Most applicants to the NA course are single parents, older adults who are trying to balance family responsibilities with academic

demands. The single parent often drops the course because of family crisis or inability to keep up with the academic demands of the course. While they can often manage for a few weeks, or a month, a sixteen week semester becomes a barrier to success.

Applicants to the NA course may also be educationally disadvantaged, and therefore, experience difficulty in meeting admission requirements. Those who are admitted to the course often find the course challenging because they do not have the academic abilities needed to meet with success. The dropout rate is high which results in low course retention and completion rates. Of the last five NA classes, the retention rate has varied from a low of 33.3% to a high of 100%, the average 67%.

The development methodology was used to develop the Nursing Assistant certificate program. Seven procedures were followed. First, a literature search was conducted. Second, input was gathered from internal and external resources using a variety of strategies such as conversations, focus groups, and telephone interviews. Third, a formative committee was formed to validate and review the data. This committee also identified the essential components of the Nursing Assistant program and determined criteria and strategies for evaluation. Fourth, a Nursing Assistant program was developed using input from the formative committee. Fifth, a summative committee reviewed and evaluated the designed Nursing Assistant program using the established criteria. Sixth, revisions were made based on the recommendations of the summative committee. A plan for implementation and evaluation of the designed nursing assistant program was also developed. Seventh, the program was submitted to the college academic leadership team. It will also be submitted to the New Hampshire Board of Nursing for their approval prior to implementation.

The first phase in redesigning the nursing assistant course was a search of the literature to discover information about the following topics: competency-based education, open entry-open exit curriculum design models, self-paced/self-directed learning, nursing curricula models, and adult learning theory.

The results of the literature review revealed that the competency-based curriculum design is an effective educational model that has been used in technical education as well as in nursing education (Alspach, 1995; Ashworth & Saxton, 1990; Baurer, 1993; Brown, 1994; VEETAC, 1992). This learner-centered model effectively integrates concepts and principles of adult learning theory with teaching and learning strategies (Ashworth

& Saxton, 1990; Brookfield, 1986; Brown, 1994; Damyanovich, Copa & Pease, 1992; Farley et al., 1992; Jilk, Shields, Copa & Pease, 1992; Plato, 1995; Sutcliffe, 1990; VEETAC, 1992).

Further evidence documented the value added to the learning process for students. In a learner-centered curriculum, the learner assumes an active role in the learning process. This results in a highly motivated individual as the motivation comes from within the person rather than from external sources (Knowles, 1975, 1980, 1984; St. Clair, 1990). An added benefit from this design model is that the learner can become a self-confident, self-reliant, knowledgeable and competent person who is able to engage in critical decision-making and adapt to situations as they occur (Brookfield, 1986; Carnevale Gaines & Meltzer, 1990; Knowles, 1975, 1980, 1984; St. Clair, 1990). These attributes are essential in today's health care environment.

The literature search also provided critical information relative to the advantages and worth of OBE. This information was used to design the new curriculum as there was a dearth of information about open entry-open exit design models. The rationales for selecting a competency-based approach are summarized below.

First, CBE builds upon previous knowledge and skills acquired by the learner. Through an assessment process, the learner may be able to demonstrate competence in certain aspects of the curriculum. This assessment of prior learning enables the learner to receive credit and avoid unnecessary duplication and repetition in the learning process (Brown, 1994; VEETAC, 1992). This information became the basis for developing a process for assessing prior learning and awarding credits. It will also provide a conceptual base for developing articulation agreements between other college nursing programs.

Second, the assessment and evaluation process in CBE uses criterion-referenced evaluation rather than norm-referenced evaluation. Alspach (1995) states that "the purpose of [this] evaluation is to measure an individual learner's performance in relation to a predetermined set of behavioral criteria" (p. 135). Criterion-reference evaluation lends itself to assessment of competence in nursing education and practice because the discipline of nursing has well defined clinical competencies with performance criteria. These technical competencies are based a job analysis for each level of nursing that was done by the National Council of State Boards of Nursing (NCSBN). The capstone of each entry level nursing program is the licensure examination that assesses competence to practice nursing.

Because CBE uses criterion-reference evaluation that compares the learner's performance in relation to a set of predetermined standards, the evaluation process can be objective and completed by anyone familiar with the standards (Alspach, 1995; VEETAC, 1992). Another advantage of criterion-referenced evaluation is the fact that a variety of methods can be used to assess the learner's competence. The more common methods appear to be direct observation of the individual performing the skill and written exams. However, other techniques can also be used such as developing a portfolio that documents the competencies mastered (Alspach, 1995; Baurer, 1993; VEETAC, 1992). This information became the framework for developing the evaluation processes within the new curriculum.

Third, CBE also clearly delineates what the learner is to know. Clearly written competency statements reflect the role and job functions as well as non-job related skills. Because these statements are written in measurable terms, learners can self-evaluate whether or not they have learned the material or mastered a technical skill (Alspach, 1995; Blank, 1982; Brown, 1994; Damyanovich et al., 1992; Furman, 1994; Jilk et al., 1992).

This information will be used to develop the self-study modules for each unit in the NA courses.

Fourth, competency-based programs effectively prepares the learner for employment by developing competence in technical skills directly related to the field of employment. This curriculum design model can be highly effective in nursing education. The technical skills that each nursing assistant is expected to be able to demonstrate competence are well documented in the literature as well as in official documents such as the Administrative Rules of the New Hampshire Board of Nursing (1994). Graduates of nursing assistant programs must demonstrate competency to perform basic nursing skills on both a written and competency-based practical exam. Individuals who cannot demonstrate competency are denied licensure or certification (Dille, 1992; Ellis & Hartley, 1995; Hegner & Caldwell, 1995; NHBON, 1994; M. Yopst (personal communication, August 5th, 1996). This information was critical for identifying the scope of the curriculum.

The review of the literature also provided the information needed to determine implementation strategies for the open entry-open exit, competency-based program. The literature suggests that adult learners have a need for flexible scheduling and access to programming that allows for them to drop-in and drop-out of college based on personal needs (Cohen

& Brawer, 1996; Damyanovich et al., 1992; Levine & Associates, 1990; Parnell, 1990). The open entry-open exit design model, in combination with CBE, will meet this need. Access to the Nursing Assistant program will increase. Applicants who meet the admission criteria and have completed the admission process will be able to start the program at a time that is convenient for them. The issue of waiting until a class of eight applicants have been admitted will be a moot point.

Effective implementation strategies for competency-based programs includes the use of self-paced, self-directed learning. This methodology was selected for the NA program because self-directed learning exemplifies the learner-centered pedagogy approach (Alspach, 1995; Caffarella, 1994; Galbraith, 1991; Knowles, 1975, 1980, 1984; Piskurich, 1993).

Research studies documented that self-paced, self-directed learning modules are effective teaching tools that have been used successfully in nursing education (Henderson, 1995; O'Connor, 1990). They allow the learner to individualize their learning based on learning style and preferences. The ultimate goal is demonstration of competence. Therefore, learners can progress at their own pace rather than according to a time frame imposed by the traditional semester academic calendar (Alspach, 1995; Brubaker, 1990).

Furthermore, self-directed study allows the learner to match learning needs with teaching methods that complement one another. The literature suggests that a variety of teaching strategies be used to assist the learner in achieving his/her potential. These strategies may include computer assisted instruction, independent study, reading in selected texts, viewing of audiovisuals, and seminars (Abruzzese, 1992; Baker et al., 1993; Brubaker, 1990; Milheim, 1993; O'Connor, 1990).

The result of the literature search on nursing curricula models revealed a need for change. Nurse educators must move away from the Tyler curriculum model and into the new millennium with a nursing curriculum model that embraces adult learning theory, collaborative efforts between nursing education and practice, critical thinking skills, and development of skills for lifelong learning. The implementation of the self-paced, self-directed competency-based nursing assistant curriculum at NHCTC-Claremont will demonstrate a paradigm shift away from the traditional Tyler curriculum model. Although the emphasis will be on program outcomes and the learner's ability to demonstrate competence in nursing related activities, some of the elements of the Tyler curriculum model will

continue to be evident. These elements, such as philosophy and detailed course syllabi, are required by the New Hampshire Board of Nursing (NHBON). Perhaps this model will provide the impetus for change at the NHBON.

The results of this study produced a unique 24 credit open entry-open exit, competency-based Nursing Assistant Program which exemplifies the five essential elements of the community technical college that were identified by the New Hampshire Department of Regional Community Technical Colleges Board of Governors. First, the program is a technical program that prepares individuals for entry level positions as nursing assistants. Employment opportunities will be enhanced. Graduates of the program not only will be able to function as nursing assistants but also as unit secretaries. Being able to demonstrate basic computer literacy will be value added to the nursing assistant's nursing skills.

Second, the open entry-open exit, competency-based design model will increase access to the NA program by providing multiple opportunities for admission. Admission will center on the individual's needs rather than on the predetermined academic calendar for beginning and ending dates.

Third, the self-paced, self-directed approach is clearly a learner-centered teaching strategy. Emphasis will be on meeting the needs of the adult learner as he/she progresses through the NA curriculum. The learner will be able to select learning strategies that best meet his/her learning style and preferences. Success for each individual will continue to be a high priority for the nursing faculty. The faculty mentor will facilitate the learning process by creating an environment that nurtures the learner. According to Brookfield (1986), "the aim of facilitation is the nurturing of self-directed, empowered adults" (p. 11).

Fourth, graduates of the NA program will be able to apply for advanced standing into the Practical Nursing program at NHCTC at Claremont. The Associate Degree Nursing program is currently undergoing curriculum revision that will also include a direct articulation from the NA program. A set of core competencies will be the focal point of this articulation.

The fifth essential element of the community technical college is the provision for economic development and employee training. The open entry-open exit design model also exemplifies this component by providing an educational opportunity for health care workers to pursue a career in nursing. Because of the flexibility with self-paced, self-directed study,

individuals will be better able to balance family, work and educational responsibilities. The college can provide cost effective cross-training for health care workers who want to become a nursing assistant.

The Nursing Assistant program that was produced also exceeds the standard established by the NHBON. The Board of Nursing requires 40 hours of theory and 60 hours of clinical practice. The certificate NA program at NHCTC has a total of 320 hours of theory, 96 hours of laboratory experience, and 96 hours of direct client care in a health care facility.

There are several rationales for the increase in number of hours. First, given the changing role of the nursing assistant in health care, it was determined that the NA must have a more in-depth knowledge base in order to practice effectively. Therefore, the content was expanded in the following areas by developing separate courses: (a) anatomy, (b) communication and interpersonal relationships, (c) growth and development, and (d) nutrition. Although this content is also identifiable in NAS 107 Fundamental Skills the Nursing Assistant, it will only be a review.

A second rationale for more course content relates to the cross-training of NAs in health care agencies as unit secretaries.

In preparation for this additional role, the NA must learn medical terminology, basic medical transcription, and basic computer skills. NA graduates of the NHCTC program will have an added advantage when applying for employment.

Third, the number of clinical hours was increased to provide additional opportunities for the nursing assistant to develop self-confidence and organizational skills. Feedback from employers of NAs indicated that the minimum 60 hours was not enough clinical time for the new NA to feel comfortable in the clinical setting.

Prior to direct client care, each student will have completed the following courses: (a) NAS 100 Anatomy for Nursing Assistants, (b) NAS 101 Medical Terminology for Nursing Assistants, (c) NAS 103 Communication and Interpersonal Relationships, and (d) NAS 105 Nutrition. Therefore, the following content will have been covered before the learner enters the clinical setting:

(1) orientation to role of the CNA (NAS 107);
(2) holistic approach to care throughout the lifespan (NAS 104 and 107);
(3) communication skills (NAS 103);
(4) safety and emergency procedures (NAS 107); and
(5) content which addresses the client's rights, dignity and confidentiality (NAS 107).

The NA program is grounded in the tenets of the learner-centered curriculum design. Although specific courses have been identified in the curriculum, the learner will be able to select the sequence of courses to meet his/her need.

Upon admission to the program, the learner will be assigned to a nurse faculty who will serve as the mentor and academic advisor. Together, they will develop an academic plan for completing the program. Three courses have co-requisites and/or prerequisites. However, six courses do not.

The mentor and learner will collaborate and develop a learner/mentor contract. The purpose of this contract will be (a) to define mutual times for mentoring discussions; (b) to determine times for written evaluations and demonstration of clinical competence; and (c) to clarify role expectations for the mentor and learner.

The mentor will be responsible for tracking each learner through the curriculum. He/she will also be responsible for referring learners to the appropriate student support service if a need is identified.

Written module exams will be prepared and administered by the program faculty. The written exams will be formulated using the course, unit, and expected outcome competencies. Letter grades will be issued based on the academic grading policy established by the college. Students must achieve at least an average of 80% on the written examinations.

The clinical component will be implemented using the preceptorship clinical model developed in 1995. This model is designed as a partnership between the New Hampshire Community Technical College and a clinical agency. Students will complete their clinical experience under the direct supervision of an agency registered nurse. This model exemplifies one of the concepts in the School to Work program.

Students will receive a satisfactory/unsatisfactory evaluation on the clinical skills performed in the nursing arts lab and in the clinical field experience. Students must receive a satisfactory evaluation on the clinical competencies as well as pass the written exams with a composite score of at least 80% in order to receive a passing grade for the course.

The next phase in the development of this certificate Nursing Assistant Program is currently underway. The outline, course syllabi and self-study modules are being written. Upon completion of this task, an advisory committee will be asked to review this material. After their approval, the completed curriculum will be submitted to the New Hampshire Board of Nursing for approval. After receiving approval, the Chair of Nursing will implement the established plan for implementation and evaluation of the unique Nursing Assistant curriculum-designed model.▼

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A CLASSROOM EXPERIMENT: THE EFFECT OF INCORPORATING LEARNING STYLES STRATEGIES UPON THE TEACHING OF INTRODUCTORY CHEMISTRY

Perry Seagroves

Introduction

Carl Jung first developed the idea that people can have different learning styles. He said that there were four major learning styles in people, based upon the way that their brains perceived information and the way that this information was initially evaluated.

Jung said that people perceived information either by sensing or intuiting. Sensing is the taking in of almost all the information about the environment. A strong intuitor can ignore most of his environment and just be concerned with one object or stimulus. Seventy per cent of people naturally sense and thirty per cent naturally intuit.

Jung said that people's brains could evaluate information in one of two methods. The information could be evaluated in a more emotional manner called feeling. A strong feeler tends to react emotionally to his environment. The second method of evaluation is to unemotionally analyze this information. A strong thinker evaluates information by the logic that he has developed. Fifty per cent of people are naturally feelers and fifty per cent are naturally thinkers.

Jung's concepts define four major learning styles.

1. SENSING-FEELING (SF). This person is a keen observer of human behavior and is very aware of his environment. He is a real "people" person because he is very aware of both his feelings and those of other people that he is dealing with. The sensing-feeling student can be easily distracted and is easily discouraged and intimidated. He is usually more successful outside of school than in school.
2. SENSING-THINKING (ST). This person perceives the world to be a very concrete and "black and white" place. He likes facts, rules, organization, and consistency. He does not like variation and abstract concepts. The sensing-thinking student likes following set processes and procedures, but does not like to have to think creatively or analytically.

3. **INTUITING-THINKING (NT).** This person is interested in abstract ideas, possibilities, and the overall meaning of ideas. He often appears to be "off in his own world". He would rather read and think than interact with people. The intuiting-thinking student is not concerned with details, but is very comfortable in performing detailed analysis.
4. **INTUITING-FEELING (NF).** This person is typically very enthusiastic, energetic, and imaginative. He values his individuality and does not like conformity and rules. The intuiting-feeling student tends to be very erratic in school. He will perform very well in a class that he is interested in and perform very poorly in a class that he is not interested in.

We all have brains that can function in all four learning styles. Most people are more comfortable with one learning style and will tend to process most information in that style. A typical population has the following distribution of learning styles:

Sensing-Feeling (SF):	35%
Sensing-Thinking (ST):	35%
Intuiting-Thinking (NT):	20%
Intuiting-Feeling (NT):	10%

It should be noted that-Jung then said that each group was then modified depending upon if the person is introverted or extroverted. He also then divided each group into two separate groups depending upon the dominant function. This led to the creation of sixteen separate learning styles. I only discussed the four major learning styles in my experiment.

HYPOTHESIS OF THE EXPERIMENT:

Students must learn how to think analytically in order to be successful in physical science classes. This type of thinking comes naturally to students who are comfortable in the NT learning styles. The other students have to adapt to NT learning styles during the class. Physical science teachers are almost always NT learners. Teachers tend to teach in a manner that is consistent with their learning style. This means that physical science courses require 80% of the students to modify their natural learning styles and are typically taught in a manner that provides little support for their natural learning style. The results of this is that most people do not like taking physical science classes and perform at a lower level in these classes than the level that they potentially should perform at.

It is my hypothesis that a physical science teacher who used strategies designed to favor all learning styles and who patiently helped students adjust to this change in learning style would increase the academic performance of his students. The students would have a more positive attitude towards the physical sciences and their own abilities in the physical sciences. There would be an improvement in the grades of these students and also less students would drop out of the course.

DESIGN OF THE EXPERIMENT

I chose to run this experiment in my Introduction to Chemistry class that I was teaching during the Spring semester of 1997. This is a non-credit class that basically serves as the equivalent of high school chemistry to students who wish to enter one of our health care programs. Almost all the students in this class either did not take chemistry in high school or took chemistry and earned a grade below C. This is typically a class where a great many of the students are afraid of chemistry. The academic achievement of the students in this class is very erratic. This was the fourth consecutive year that I have taught this class during the Spring semester.

There was very little changed in the academic portion of the course. The same material was covered. Seventy five per cent of the students' grade came from four lecture tests, the average of lab reports, and a comprehensive final examination. I generated new tests, but they were very similar to those of the previous years. I think that I actually made the tests a bit more difficult as the semester progressed. I did change some of my quizzes that count for fifteen per cent of the students' grade.

Experimental strategies included:

1) explaining the theory of learning styles
2) having the students all take learning styles test
3) meeting with the students on a one-on-one basis to develop a strategy based upon their learning style
4) having many collaborative activities
5) calling homework "practice tests" and designing the homework to look like a test
6) presenting lecture material by the use of visual organizers
7) trying to learn the name of each student and a little of their background early in the semester
8) allowing more of my own personality to come out into the classroom

I tried to present information in a manner that would appeal to the SF and ST learners. One change that I made was a very subtle one, but it may have been the most important change. I tried to always appreciate and respect each person's individual learning style and uniqueness. I constantly stressed that students had the intelligence to do the course work and that it was just a matter of adapting to the NT method of thinking.

RESULTS

It is always difficult to quantitatively measure the effect of a teacher or teaching technique upon the academic achievement of one class of students. I decided that I would try to measure the effectiveness of my experiment by evaluating the following: 1) the retention rate, 2) average student grades, 3) student evaluation, and 4) my professional evaluation.

The retention rate is typically fairly low in this class. There are usually a number of young students who are not very motivated and are not really sure what career they want to pursue. These students tend to stop coming to chemistry class after spring vacation.

I calculated the retention rate by dividing the number of students that took my final examination divided by the number of students that were in the class by the end of the first week of class. The results for my last four classes are as follows:

	No. of Students at Week #1	No. of Students at Final Exam	% Retention
1994	30	22	73.3%
1995	34	31	91.2%
1996	45	38	84.4%
1997	31	28	90.3%

I consider this to be a very good retention rate. The only year that was better was in 1995 when the same number of students (three) did not take the final exam from a slightly larger class. I was able to talk to two of these three people. They both stopped coming to my class because they had changed their minds about what academic career they wanted to pursue.

I made two calculations for measurement of academic achievement. The first is the average course grade (out of 4.0) for the students who took the final exam. The second calculation was the percentage of the students in the class during the first week who achieved a grade of C or above. This is significant because almost all the students need a minimum grade of C in order to be accepted into their chosen health care program. The results compared to those of my previous three classes are:

	Average Grade	% with C or Above
1994	2.52	63.3%
1995	2.96	85.3%
1996	2.78	68.9%
1997	3.06	83.9%

The level of academic achievement of my 1997 class is very similar to that of the class that I had in 1995, which was known to be an exceptional class. The achievement level of both classes, 1995 and 1997, are significantly above that of my other two classes. This was somewhat surprising in that the 1997 class did not have a good academic reputation before this semester.

The last three classes all had the same teacher in Biology in the previous semester before they took my chemistry class. I have always found that my grades in this course tend to be fairly similar to those of the Biology teacher. I calculated the average grade in Biology for all the students that I had the subsequent semester for Introduction to Chemistry. I then compared the grades:

	Average Grade Biology	Average Grade Chemistry	% Difference
1995	2.99	2.96	- 1.00%
1996	2.94	2.78	- 5.59%
1997	2.57	3.06	+8.81%

This data suggests that the learning styles strategies helped to turn a class with a mediocre level of academic achievement into one with a good level of academic achievement.

My analysis of grades revealed two other interesting points. The average test scores for the 1997 class showed an unique pattern. This was the only year that the test average increased as the semester progressed. These averages are:

	Test #1	Test #2	Test #3	Test #4	Overall Average	Final Exam
1994	75.2	77.4	77.1	74.1	76.0	68.6
1995	87.7	79.0	81.3	76.4	81.1	82.4
1996	77.4	74.1	84.5	83.0	79.8	76.0
1997	82.2	82.3	86.6	89.8	82.4	82.4

This suggests that the class was becoming more and more comfortable with chemistry and taking chemistry tests. This level of comfort was only partially felt on the final exam.

The second unusual pattern about the grades was that even though the 1997 class had the highest average grade, the class only had the third highest number of A grades. This class did have an unusually high number of students that earned A- and B+ grades. The breakdown on the grades, based upon the number of students who took the final exam, is as follows:

	A	A-	B+	B	B-	C+	C	C- or Below
1994	9.1%	0.0%	22.7%	0.0%	9.1%	18.2%	27.3%	13.6%
1995	19.4%	6.5%	6.5%	22.6%	19.4%	16.1%	3.2%	6.4%
1996	26.3%	5.3%	13.2%	7.9%	13.2%	5.3%	10.5%	18.4%
1997	17.9%	17.9%	21.4%	0.0%	14.3%	14.3%	7.1%	7.1%

This data suggests that the learning styles strategies does not necessarily produce A students. It does appear to improve the academic performance of the "middle range" students so that they achieve at a B+ or A- level instead of a B or B- level. It also suggests that these strategies tend to produce a similar increase in academic performance for the students that are at the C range.

It was obvious early during the semester that the students thought that this learning styles program was valid. The older students appeared to be much more interested in the discussion of learning styles and its implications than the younger students were. The younger students however did appear to respond to the strategies. The bond between myself and my students was stronger than I have ever had with any class of students.

I had the students do a standard evaluation of the class and myself at the end of the semester. I also had the students do an evaluation of the effectiveness of each individual learning styles strategies and the overall effectiveness of my experiment. All the evaluations were done on a 1 to 7 scale. I collected 25 evaluations. 21 (84%) people rated the overall effectiveness of the learning styles strategies as having an effectiveness of 7 (the highest). The other four people rated the effectiveness a 6.

One definite effect of my learning styles experiment was that it gave my students an unrealistic view of my abilities as a teacher. I could see as the semester progressed that the students developed this belief that I knew something about teaching that other science teachers did not know. I received glowing evaluations from the students. 22 out of the 25 students rated my overall effectiveness as a teacher a 7. The other three students rated it as a 6. Even though I think that 4 or 5 would be much more realistic.

My personal evaluation of the effectiveness of the learning styles experiment is that it was effective. This class of students developed more

confidence in their abilities. This increased their level of motivation. I had fewer students give up. I was impressed with the way that the academic performance of the class steadily improved as the semester progressed. This was remarkable in the fact that this class had academic problems with other classes at the school.

CONCLUSION

Every teacher knows that each classroom situation is unique. This makes it very difficult to scientifically pfove the effectiveness of any teaching technique, especially on the basis of one class. I do know that I had a very successful semester teaching these students. I am sure that I would have had some success with these students without using the learning styles' strategies. The biggest advantage of the learning styles may be that it immediately gives unconfidant students something that they can use to gain confidence. I have learned how to carefully build upon that confidence as the semester progresses. This confidence building process had occurred in all of my previous classes, but the learning styles discussion certainly enhanced it. The learning styles activities allowed the students to learn chemistry in a manner that agrees with their learning styles. This allowed the students to slowly adapt to the NT way of thinking.

I can see two possible disadvantages of using these learning styles' strategies as much as I did. It was a great deal of work for me. It certainly was rewarding work in the fact that the class greatly appreciated all the effort. But it was WORK. The second possible disadvantage is the possibility that these students will lose confidence during the next semester when they take classes that do not contain these strategies. I tried to prepare the students for these during the last month of the class. I will find out how successful I was during the next school year.

This experiment has convinced me the necessary of incorporating learning styles strategies into physical science classes. I was really surprised by how universally the students thought that these strategies were effective. I would have probably ignored these strategies as a student, but I am a strong NT. I plan on incorporating some learning styles strategies in all my courses depending upon the students and the level of the course. I feel that the lower level classes need a fairly heavy emphasis on learning styles. The more advanced classes probably only need a quick discussion on learning styles and only a few of the activities. I would plan on then applying these strategies only in greater emphasis only to those students who request it or are having academic problems with the course.

This experiment proved to be quite an emotional experience for me. I never had a class before that gave me such positive reinforcement. The SF students especially appeared to gain a great deal of positive energy when they were successful in this course. A great deal of that positive energy was directed towards me. I am currently planning how I can incorporate some of these strategies into my summer physics class. I think that these positive reinforcement can prove to be addictive.▼

DEFINITION OF THE TECHNICAL PROBLEM SOLVING PROCESS

Lafayette J. Harbison

The solutions to modern technological problems will not be found by looking to the past. Most technical problems are unique and most solutions are therefore unique. Depending on the discipline, students, educators, educational literature and educational leaders, describe students as having poor problem solving skills. The term "problem solving" takes on many meanings in technical education. The lack of a precise definition of problem solving results in confusion in determining the needs of education and training, and a fragmentation of the efforts to improve the "problem solving" abilities of our students.

The goal of this paper is to develop an operational definition of the process or function of technical problem solving. Technical problem solving is content based on, but not driven by, content. It is a process with content at each end: the problem and the solution. Between the problem and the solution are additional elements of content and a complex analytic process. The end product of technical problem solving is often characterized by the requirement to make something from raw materials, combine existing parts or systems to accomplish something the individual parts or systems could not do independently, or fix something that no longer does what it should.

Technical education traces its heritage to colonial America and to the Land Grant Colleges. Among the first models were the apprenticeship model best illustrated by the proverb, " I hear, and I forget; I see, and I remember; I do, and I understand" (Lao Tzu, 600 B.C.). With the focus on the "I do, I understand," technical educators interpret that doing somehow replaces, or includes, the hearing and seeing. The advantage of the apprenticeship model is that the student becomes intimate with the routine, job entry, duties of the professional. The disadvantage is that the student is limited to the knowledge and experience of the particular teacher and the equipment used. There is little thought given to generalizable or transferable skills and the knowledge obtained from the theories of the content of the discipline. This leaves holes in both knowledge and experience, and limits the ability of the student to change and grow.

With the advent of scientific management of Frederick Winslow Taylor, technology made it possible to divide work into repetitive tasks, none

requiring much education or training (Marshal, 1993). Technical education reflected this attitude and in many cases is little more than multiple, serial or parallel, apprenticeships. This form of education assumes that the student will gain professional competency by observation and imitation. In the classroom, students are directed how to repair or build, how to think, and the meaning of each stimulus by model and or class of equipment. This cloning process is short term efficient, and leaves the student with little to grow with as the face of work continues to change at an ever increasing rate. Albert Einstein (1954, p. 66) summarizes this form of education describing the man trained **only** in a specialty as more resembling, "a well-trained dog than a harmoniously developed person".

EMERGING PARADIGM

In contrast, John Dewey, in 1933, introduced a learning model based on the scientific method intended to develop what he called "reflective thinking" (Costa, 1985, p.166). This method of learning reflects Baconian ideas and requires the student to process data and test the answers developed. The elements of this method as defined by Costa are "suggestion, formation of a problem, hypothesis, reasoning, and testing of the hypothesis". Ozmon (1981) credits John Dewey with pointing out that:

> the facts we teach children today may be out of date by the time they graduate. Thus he emphasized a problem-solving method that he felt would be as useful in the future as it is in the present. (p. 130)

Duncker (1945), contends that:

> He who merely searches his memory for a 'solution of that such-and-such problem' may remain just as blind to the inner nature of the problem-situation before him as a person who, instead of thinking himself, refers the problem to an intelligent acquaintance or to an encyclopedia. . . . But such problem-solving has little to do with thinking. (p. 20)

Paul (1991) describes the schools of tomorrow as requiring students to learn to think critically and to develop problem solving skills. Critical thinking is a process of clarification of thought, and as such is a part of all problem solving activities.

The U. S. Department of Labor report (SCANS), Learning A Living: A Blueprint for High Performance, (1992) identifies the following functions of a worker as necessary for solid job performance: process information, work with and understand systems, and work both individually and

collaboratively. Wirth (1992) emphasizes that a new kind of learning must begin when numbers and buttons take the place of wrenches and hammers. He outlines the functions of this new kind of learning as:

- abstraction - the capacity to order and make meaning of the massive flow of information, to shape raw data into workable patterns;
- system thinking - the capacity to see the parts in relation to the whole, to see why problems arise;
- experimental inquiry - the capacity to set up procedures to test and evaluate alternative ideas. (p.363)

Additional elements of technical problem solving are illustrated by the following authors. Simon (1979) describes problem solving as characterized by, "sudden illumination" (1979, p. 141). Osborn (1963) adds problem-solving consists of, "(1) Fact-finding. (2) Idea-finding. (3) Solution-finding." (p. 86) And Merrienboer (1991, p. 9) defines problem solving as a complex cognitive skill characterized as: recurrent, non-recurrent, procedural and non-procedural. De Bono (1992, p. 28) describes, "Those who sit back and wait for the analysis of information to give them directions are going to miss out entirely".

Educators often quote, "Those who cannot remember the past are condemned to repeat it (George Santayana)," and a study of known problems and their solutions is a highly validated method of preparation and development of the basic tools of technical thought. The accumulation of facts and content is no longer considered an education, and the teaching of facts and specific content is not an effective means of teaching technical problem solving. The technical problem solver must recognize that the information for solving a given problem is within the perceptions and concepts of the problem itself and be able to demonstrate the ability to solve the problem through clear thought, thinking with and in systems.

DEFINITION

From the above, a definition of technical problem solving can be synthesized as: A disciplined, creative, systematic, reflective and heuristic human process for bridging the gap, or conflict, between expectation (what is wanted) and reality (what is or what exists). This gap or conflict may be described in mathematical, social, ethical, scientific, political, or other terms. Technical problem solving narrows the definition by adding the requirement for high level cognitive skills, operating in an atmosphere of rich declarative knowledge, to solve highly technical, content based, many times non-recurrent, problems. A characteristic of this type of problem solver is they may not know what they are looking for until it is found.

Preparing a student to solve these non-recurrent technical problems, in a continually changing discipline, will require creativity on the part of technical educators. The key to the identification and formation of new technical education learning models is the development of an operational definition for technical problem solving.

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A SPARROW DOESN'T LIVE IN A PC

Tom Gorka

"What Is A Sparrow?" A sparrow is a small brown, black, and white critter that flits. A sparrow is a warm-blooded flying creature. A sparrow builds rather untidy globular grass or straw nests and commonly locates them in tree crotches. The true sparrow is native to Europe, Asia, and Africa and was reportedly brought to America to provide the English rulers with a touch of "Old England." The house sparrow was introduced to North America at Brooklyn, New York in 1850 and 1852 to combat the canker worms which were infesting the borough shade trees. The sparrow being very prolific populated the whole continent by 1900. A sparrow is not an illustration, a definition, or a description in ornithological terms complete with the Latin name. A sparrow doesn't live in a PC.

The winter constellation Orion is often - and perhaps rightly - regarded as the most splendid of all constellations. Some star groups seen among many random collections on a clear moonless evening require a great stretch of our imagination to visualize the ancient shapes; however, the hunter, Orion, found in the southern winter sky almost waves his club at you. According to mythology, Orion was a supreme hunter and is today seen locked in combat with another ancient figure, Taurus the bull. So much for the mythology. Orion contains a whole array of astronomical objects. The star Betelgeuse is a red super giant whose diameter of 250 million miles could easily contain the entire orbit of the earth around the sun. There are eclipsing binaries - two nearby stars which orbit a common center. Also there are blue giants, open clusters, and nebulae. One nebula designated M42, found in Orion's belt, is visible to the naked eye. Finally, the stars which outlining this ancient character that appear located on the surface of the celestial sphere. In reality, they are vast distances apart, some closer and some further away from us in the cosmos. The constellation Orion doesn't live in a PC either.

So what is my point? My point is that we often put a simple name on a complex object, creature or concept then we illustrate the object, creature or concept in a supersimplistic fashion. (e.g. there are 12 species of "true" sparrows and 88 constellations) This approach has serious shortcomings and relegates interesting, complex, and exciting topics and concepts to a series of words or phrases, a picture and a sentence. This concise but pas-

sionless method dismisses topics which may have been a lifetime pursuit of teams of scientific investigators. Gravity is not g. Density is not mass divided by volume, and Mu is not the coefficient of friction.

Before we wholesale our teaching approach to a singular visual mode at neat, reliable, computer learning stations, with no need to actually do physical, chemical, or biological experiments, we should take a long hard look at our goals. I know that using the data or field observations of practicing scientists avoids the muddy boots and insect bites, as well as circuits that crash and machines that seize.

Furthermore, although the night sky is clearer on a color monitor and a computer lab is much warmer in mid-winter then the out of doors, the experience is second order and you will never hear the birds stop singing, or feel the temperature drop during a solar eclipse on a PC.

The fact is nothing lives in a PC except migrant electrons.

The world, however we view it, needs to be experienced first hand to really be understood, enjoyed and cherished.

ACKNOWLEDGMENT:

Recently I attended a National Science Teachers Association Conference on Global Science and science Education in San Francisco, California.

One of the general sessions that I attended was titled "Never Mind What They Told You In School, How Do You Know That The Earth IS Round?" The presenters Phillip and Phyllis Morrison are internationally known scientists and science teachers. This piece is motivated by that presentation.

TRANSITION WRITING

Bill Warnken

In the teaching of writing, it seems reasonable to assert that we encourage our students to develop catchy introductions, to back emerging theses with solid support, and to finish essays with compact conclusions. Yet the area most common to all these and the easiest aspect to neglect, the one that provides the connective tissue for the piece, is the art of transition, an undertaught yet essential part of the process.

Transitions need to be as natural in writing as they are in so many other areas of life. Transitions underpin our daily existence - from the biological progression through the day to our job performance to our exercise. We observe transition in all art forms, from the blending of colors on a canvas, to the lines of a sculpture, to the leit motif of an operatic offering. But do we send our writing students off to face the blank page with some inherent faith in their ability to "only connect" when we should be providing them a pedagogical impetus to form transitions?

A simple series of classroom drills will challenge students to creatively approach transitions while enjoying themselves at the same time. The three-part unit consists of the following:

1. The paragraph "from" or "to" a line.
2. The group paragraph(s)
3. Transition writing

In the first exercise, the instructor or, eventually, a student supplies a line which students and the instructor then write a paragraph "from" or "to." The line, then, either opens or closes the graph. Initially, it is advisable to keep these lines rather broad if slightly sensational. "That was the last thing I expected," "I've never met anybody quite like. . .," "It was the strangest moment I can remember," etc. have all worked well.

The intended air of intrigue is an element that will imply contrasts within the experience. These contrasts will accentuate the need for deft transitions. Writers will make transitions on the fly (later to be reviewed/revised), often employing contrasting conjunctive words such as "but," "yet," "despite," "however," "nevertheless," etc. The resultant paragraphs can be used at the beginning of class to jump start the writers, who then tap into each other's imaginations as pieces are circulated and/or read aloud. The class pays special attention to the transitional links or "hooks" therein. The instructor here points out that virtually all parts of speech,

alone or in combination, can serve as transitional hooks with demonstrative pronouns, for example, capable of embedding the essence of the preceding sentence into the one at hand. And, of course, the hook may be implicit as it advances the previous line or refers to an earlier theme lines or graphs above.

The second phase of this unit involves the group paragraph(s). This exercise is elemental yet extremely challenging in terms of transition. Each student must add one line to a circulating paragraph, started by the first student. Larger classes may need to have several sheets circulating or advance to the point where the class creates consecutive graphs with internal and external transitions, those within and between paragraphs. Each writer in this drill is, in effect, adding a transitional line, not fully realized until the next student has continued the chain in this ever-evolving string of transitions. Maintaining a topic and a point of view while insuring continuity here is indeed a formidable task for the class. The last few students share the unique responsibility of bringing the piece to a feasible conclusion. Reading the group paragraph aloud (faulty transitions often have a discordant sound) and reproducing it is essential. Instructor and students will then assess the strengths and weaknesses of the various transitional words, phrases, or lines, remembering that each line clearly drew its life from the one(s) preceding it. Performing this drill while sitting in a circle is quite effective. The circular setting permits students to feel the connection implicit in the exercise while also sharing the physical manifestations of the task as head-shaking, laughing, and general body language (all transitional devices of speech) often play a part in each writer's struggle to keep the paragraph viable.

The unit concludes with the transition writing exercise. Each of four students is asked to write a sentence independently and deliver it to the instructor. The instructor writes the four lines on the board. At first, students assume they are to write "from" or "to" one of the lines or use the four in a group writing. They are surprised to find that neither is the case. In fact, they are required to produce a piece of indeterminate length that must subsume each of the lines verbatim and yet absorb them so smoothly that an outsider could not detect them. Of course, the more disparate the lines, the stronger the challenge to make them "fit" an umbrella topic, presumably different for each writer, that encompasses them all. Writers are allowed to use the lines in any order and can make minor changes to facilitate agreement or conjoin lines. The paragraphs emerging from this

drill are often quite imaginative, and students enjoy the entire process - built-in frustrations and all. They are also anxious to discover how their classmates resolved the situation. As before, transitional elements are attended to as the pieces are read. The class will determine which sentence proved most difficult to include (and why) and which (if any) provided a thesis, an opening line, or a conclusion. The permutations are instructive, even more so if the instructor becomes a bit diabolical and incorporates one more aspect in this third exercise - a previously chosen topic. Arranging the four lines within so narrow a field strains the writers' imaginative powers, but will again produce creative, often witty writing.

The beauty of all of these exercises is that they can be repeated during the semester. Whenever they are used, the instructional point to be stressed to students is that once they have mastered the intricacies of these forced, artificial transitions, accomplishing transitions within the unbounded universe of their own writing should become considerably easier.

Writers often begin this unit like apprentice jugglers, arhythmic and anxious. They evolve into confident, relaxed writers - focused and comfortable with the interaction of the elements of their writing circulating around them.

APPENDIX

The transition writing unit is most effective when accompanied by readings rich in transition. I have found especially helpful the writing of E.B. White, Annie Dillard, William Carlos Williams, and Martin Luther King, among others. Historical and political documents also make fine models. No purer transitions can be found than those in the compact, unified lines of "The Declaration of Independence," or "The Gettysburg Address." However, students have shown a great interest and facility in working with the omnipresent transitions in the poetry of Robert Frost. The following is a composite of years of working with Frost's "The Road Not Taken" to illustrate the use of transitional devices.

THE ROAD NOT TAKEN

Two roads diverged in a yellow wood, "roads" is an explicit hook to the title; "diverged" furthers the title's implication of a fork.

And sorry I could not travel both "both" is an explicit hook to "two" while "travel" alludes to the journey(s) - one taken, one not - implicit in the title.

And be one traveler, long I stood "traveler" is the explicit hook to "travel" as "I" is to "I," and the pause in "long I stood" was implicit in the "sorry" of the preceding line.

And looked down one as far as I could "I" is again an explicit hook while "one" returns us to the road not taken (title line)

To where it bent in the undergrowth; "it" is an explicit reference to "one" while "bent in the undergrowth" completes "as far as I could."

Then took the other, as just as fair, the transition link is "the other [road]"; it carries us back to the "two roads" of line 1.

And having perhaps the better claim, transition is implicit as "the other" still controls this line.

Because it was grassy and wanted wear; "it" hooks to "the other"; "Grassy and wanted wear" explains "the better claim."

Though as for that the passing there employing the power of the demonstrative pronoun, "that" now implicitly reprises the entire previous line.

Had worn them really about the same, "worn them" is a logical extension of "passing there."

And both that morning equally lay "both" hooks back to lines 1-2 to "two" and "both."

In leaves no step had trodden black. "In leaves" completes "lay."

Oh, I kept the first for another day! "the first" rewinds to the "road" of the title.

Yet knowing how way leads on to way, "yet" provides transition by contrast; "way," in one of its double meanings, refers to the "road" (way) of the title and the "roads" of l.1

I doubted if I should ever come back. "doubted" completes the contrast with "kept"; "come back" complements "way."

I shall be telling this with a sigh "I" explicitly bridges the last two stanzas of the poem; "sigh" is a clear progression from "doubted."

Somewhere ages and ages hence: "ages and ages" (not simply "years") give dimension and significance to "sigh."

Two roads diverged in a wood, and I - "Two roads diverged in a wood" returns explicitly to the opening line while "I" explicitly furthers the narrative voice.

I took the one less traveled by, the dash provides a transition by punctuation, allowing the repetition of "I" while "traveled" hooks to lines 2-3.

And that has made all the difference. again "that" transfers the the essence of the previous line, empowering the poem's conclusion.

The discussion of the many transitional elements in Frost often awakens students to the variety of transitional techniques available - from the direct to the subtle - as they discover the interrelatedness of the lines of the poem.

A sample of a student paragragh from the in-class transitional writing exercise, where four lines had to be included, follows. It should be interesting for readers of this article to try to identify those four (they are listed beneath the paragraph - cover them up as you read):

"Even though the rain of spring has turned into the snow of winter, the candy canes strung from our Christmas tree are melting in the yellow light refracted through our big bay window. And, as I move them to a shaded spot in the front of the tree, I realize that Christmas is coming and I haven't started buying presents yet. I recall the simple presents that my grandfather always talked about hanging on his family's tree as a child in his native Germany, where an orange so hung was a delicacy. Now, when an orange is no longer a luxury, I am more likely to eat one, note that it has no seeds, and wonder how they got them out. Maybe I should just appreciate the simple things this time of year."

The four student-supplied lines follow:

1. I note the orange I am eating has no seeds, and I wonder how they got them out.

2. The rain of spring has turned into the snow of winter.
3. The candy canes strung from our Christmas tree are melting in the yellow light refracted through our big bay window.
4. I realize that Christmas is coming and I haven't started buying presents yet.

Lines 2-4 were fairly easy to absorb. Transition by subordinating (lines 2-3) helped here. However, line #1 provided obvious problems in his specificity. Note that it thus took more prose to "transition down" to that line as the writer had to navigate the locks of a transitional canal.

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CREATING A STUDENT CENTERED LEARNING ENVIRONMENT

Jackie Griswold, Ed.D.

During the last three academic years, I have had the opportunity and privilege to be one of the four faculty within our system working on the "FIPSE Project", aka "The Curriculum Reform Project: Using Voluntary National Skills Standards in Performance-Based Curriculum Design." Working with Keith Bird, Ann Weddleton and the other three faculty, George Dykstra, David Miller, and Sonia Wallman, has been a tremendous learning experience for me. Our working relationship quickly evolved into a wonderfully synergistic collaboration as we began to redefine the teaching/learning environment.

In the spring of 1994, the New Hampshire Department of Postsecondary Technical Education was awarded a three year grant (1995-1997) from the Fund for Improvement of Postsecondary Education (FIPSE). The original goal of our curriculum reform project was to design and implement performance-based curriculum using voluntary national skills standards in four distinct program and industry areas: biotechnology, electronic engineering technology, automotive technology, and human services. The national skills standards are an outgrowth of President Clinton's "Goals 2000: Educate America Act." The act commissioned the creation of voluntary skill standards in a variety of industries so that employers, workers, unions, educators and governments could use them to strengthen workforce preparation and promote economic development. It is envisioned that these different stakeholders would use the standards in different ways: educators, as benchmarks to improve the transition from school to work; employers, as qualifications for hire or promotion; workers, as a reference for which skills are valued in the industry. The standards are competency-based, reflect state-of-the-art work practices, and benchmark to world-class levels of performance. They were developed in consultation with industry representatives and experts.

The project brought together four faculty members, from four different campuses in our system, who had not previously worked together and for the most part did not even know each other. When we first began this project I was skeptical. I wondered how I, as a 'human services' educator, would mesh with the three others who were in technical areas. It was fairly clear to me how skills standards would work for technical areas since their

specific protocols and standard operating procedures all provided clear pathways to the expected outcome. In human services there might be several different pathways toward mastery of a specific skill. I also thought I'd be more concerned with the 'attributes' which I saw as the affective domain, as opposed to the cognitive domain, inherent in human services work. What I learned is that using skills standards in a performance-based learning model works very well in human services, just as it does in the technical areas; that the attributes are a critical element regardless of the career field, and certainly not unique to human services; and that the model we were developing in our pilot project has many applications. My initial skepticism has disappeared.

The Human Services Skills standards (officially called *The Community Support Skills Standards*) provide a hierarchy of definition, beginning with an overall competency area, moving toward a specific skill standard, to an activity statement, and finally to a performance indicator. As an example:

"COMPETENCY AREA 10: CRISIS INTERVENTION

The community support human services worker (CSHSP) should be knowledgeable about crisis prevention, intervention and resolution techniques and should match such techniques to particular circumstances and individuals.

SKILL STANDARD B: The competent CSHSP continues to monitor crisis situations, discussing the incident with authorized staff and participant(s), adjusting supports and the environment, and complying with regulations for reporting.

ACTIVITY: The competent CSHSP reviews the crisis situation with authorized staff and with the participant to determine the need for ongoing support and to develop strategies for avoiding such crises in the future.

PERFORMANCE INDICATOR: After consulting with the participant and other staff, the CSHSP lists strategies for avoiding crisis in the future." (Taylor et al, 1996)

In the process of integrating the national skills standards into the human services program at the campus in Berlin, the existing curriculum was analyzed to determine which of the competency areas and skills standards were already present and how they were distributed within the major courses in the program. All of the competency areas and skills standards were represented in the existing courses. The task of integrating the skills standards more fully into the curriculum was focused on defining activi-

ties and appropriate performance indicators for each of the standards, as well as on redesigning teaching strategies to move from a teacher-led classroom to a student-driven environment. Ultimately, students are the ones who describe the performance indicator which indicates mastery of a skill standard. Based on the learning that takes place in the classroom and in their internship experiences, students provide examples of situations in which they performed the skill. Because the work of human services is so diverse, it would be impossible for the instructor to list specific performance indicators; however the skill standards provide the more global competencies required in the industry.

One of the strengths of our project is that it demonstrates that performance-based learning which uses the national skills standards as a foundation - a concept we have come to call the 'Virtual Workplace' - can be effective in any curriculum content area. And based on our experiences in working with elementary, middle school and high school teachers, as well as with industry trainers, we know the model is effective in those environments as well as in the community technical college. Feedback received from students, teachers, and industry representatives has been overwhelmingly positive, resulting in invitations to expand our dissemination work to other schools and industry sites. From our perspective, the positive feedback is the clear evidence of the effectiveness of this model.

A key idea of the 'Virtual Workplace' is that students actively construct their own knowledge. Learning is active mental work, not passive reception of teaching. In this model, teachers and peers play an important role by providing support, challenging thinking, and serving as coaches or models, **but the student is the key to learning.**

A student centered learning environment provides students with the resources to make sense out of things and construct meaningful solutions to problems. Learning should occur in real-life contexts and instruction should be personally relevant to the learner. The teacher's role is one of facilitator or coach, not necessarily knowing all the answers, but knowing how and where to find them. Teachers need to design learning models which emphasize the importance of meaningful, authentic activities. The new role of the teacher is one who designs experiences where learners are required to examine thinking and learning processes; collect, record and analyze data; form and test hypotheses; reflect on previous understandings; and in so doing, construct their own meanings. In the Human Services Program, what this means is that rather than listening to an instruc-

tor lecture on the importance of client assessment, students are working collaboratively to conduct assessments, and develop, implement and evaluate treatment plans, all within the classroom setting. Through this process, they discover the kinds of information which is necessary to collect, how ones goes about the data collection, and how to utilize the data gathered. By doing each of the steps of the process, learning by trial and error, with the instructor acting as a coach, the students are engaged in the learning process. It could also mean that a student develops supportive communication skills by practicing those skills in role play situations, as well as in 'real play' situations; students learn about group dynamics and team work by being actively engaged in group activities and working as team members to accomplish tasks representative of daily work in an human services setting, such as acting as a treatment team in working with a family.

The 'Virtual Workplace' is a very clear demonstration of a student centered learning environment. In four different curriculum areas we have created student centered learning environments in which the teacher provides opportunities for learning, but it is the collaboration among students which drives the learning. The classrooms have become 'Virtual Workplaces' in that the learning is experiential, students learn to work in teams, apply what they've learned as they demonstrate real workplace activities, and each student's input is taken seriously. Performance based learning uses authentic assessment, provides learner based activities, promotes success, is based on performance rather than endurance, and addresses more than just "knowledge". This kind of a learning environment promotes autonomy, provides a personally relevant context, and helps students develop the skills that support the learning process. It also promotes respect, an expectation of success, and a collaborative mindset.

On a personal note, as an educator with 25 years of experience ranging from being a 3rd grade teacher, to an elementary reading specialist, to working in a career-focused vocational program in a junior high school, and working for the last 17 years in community technical college systems, participating in this project has been a highlight of my career. Not only did I get to work with enthusiastic, energized colleagues; I got to work with enthusiastic, energized students who were more clearly able to see the connection between classroom and workplace. Feedback from students has been positive, and it clearly transfers into the workplace. Students from previous classes, who are now supervising some of my recent graduates, have called to let me know how well prepared these students are, and to

comment that they wished the classroom had been like this when they were there. I realized it was not the students who had changed, but the environment in which the learning was taking place which had changed. Yes, it does take time to change how I teach. Yes, it is more work for me. I have to do something other than prepare lectures and tests. I have to create an environment which is flexible, student-focused and dynamic. I have to spend more time interacting with students, working with them to evaluate their progress, supporting and encouraging their academic risk taking, challenging their assumptions, and applauding their successes. Would I trade this new way of teaching to go back to how I used to teach? Never! I am having too much fun! As are my students.

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WHAT TEACHING PSYCHOLOGY HAS TAUGHT ME ABOUT TEACHING STUDENTS

Sandy Cole

Remember the scene in "The King and I" where Deborah Kerr sang "Getting to Know You?" As her enraptured Siamese prince and princess students gazed lovingly up at her, she sang that, "When you become a teacher, by your students you are taught." She was certainly correct: you learn a lot from students. But I've found that as a teacher, you are also taught by your subject matter. I know I've continued to learn from teaching psychology- both by keeping up with new findings in the field and by having the luxury of time spent in processing ever more deeply and personally what that subject matter really means.

I've spent the last eleven years focusing on the many areas of psychology covered in dozens of very similar introductory texts. Gradually I began to mine each psychological topic for teaching clues. At some unconscious level, I asked myself how I could apply principles of psychology to my teaching. How could I enable my students to best learn the information within the attractive covers of texts already constructed with learning principles in mind? Subconsciously the ideas began to play out in my teaching methods. This article has been a revelation to me. Much of **WHAT** I teach has molded **HOW** I teach!

Not all text chapters relate to teaching methods, but a surprising number give insights into some part of the process of transferring information from our brains into the brains of those we teach. So in the order in which they appear in most textbooks, here are insights that developed as I've worked my way through the course, semester after semester.

The Brain

When we teach, and someone actually learns that information, their brains have actually become rewired! Neurons that didn't previously connect and communicate with each other have now set up a network. The cerebrum, that sits like a middle-parted toupee just under our skulls, is now more complicated. If nothing else makes us proud to be teachers, the brain constructing factor should! We actually help students to sculpt their own circuits. More material taught means a greater complexity of connections, and those connections may even make it easier for the brain to rewire

around the dying neurons that mark the onset of Alzheimer's disease. If we manage to set up a lifelong interest in learning about our subject, many of our students might also experience improved mental functioning in their old age.

The just-below-the-skull storage part of our brains consists of two similar looking halves or cerebral hemispheres, divided like the division in the Tegrin commercial for the man using two different shampoos. Why two halves? Research seems to indicate that, while they work together much of the time, each half or hemisphere is a specialist in processing different kinds of information. In PET scan studies radioactive sugar rushes to nourish the harder working half of the brain and shows more color/action on the busiest side. The left side appears to crackle with activity when we're doing tasks involving language and logic problems. The right side tingles when we are involved in creative, artistic, visualizing activities. We all use both sides; no one is completely lopsided in brain usage. But some of us, and some of our students, seem to have more talent for the skills of one side than the other.

We have to get the information to both the left and right brainers so we need to diversify how we present information. Spoken words may easily develop connections in the active left hemisphere of left brainers but not provide a powerful enough stimulus to encourage connections between the neurons of the right brainers. But if we present a diagram or a videotape of the principle for the right brainers as well as describing it in words for the left brainers, we're helping everybody to draw that material in. Using a varied presentation allows students to capitalize on their strong side while also exercising the other hemisphere where ability might not come as easily.

So learning about the brain made me even more conscious of the need to come at subject matter from as many angles as possible to connect neurons in as many parts of the brains of my students as possible.

Sensation/Perception

Millions of stimuli are bouncing around in the classroom environment: sights, sounds, smells, physical sensations from both inside and outside our students' bodies. I, as teacher, compose only a small proportion of the bits of information that might attract a student's attention at any given moment. If I want to be the focus of their perceptions, I have to keep the sensations emanating from me competitive with all the others. Mainly if

I want them to continue to direct their focus toward me, I have to be sure to vary the kinds of sensations I give off- sometimes sounds, sometimes motion, sometimes visual information.

A perceptual process called sensory adaptation works against students perceiving us. Simply put this means a constant stimulation of any kind becomes boring (you don't smell the baking brownies ten minutes after coming in the house). Then the student's perception through that channel closes down. We need to keep the neurons in the hearing area of the brain or the sight area jumping with varied information coming in. Our voices have to go up and down; we need to move around, gesture; students need to move around, do physical or mental tasks to continue to retain their focus. Educational researchers tell us that students need some kind of change every twenty minutes to keep them engaged, perceiving.

It takes work planning variations, but it can prevent us from becoming as ineffective and unnoticed as a "Peanuts" parent, physically present but perceptually absent in our student's learning picture. We can question students to get their attention on track, calling for responses and answers can come in many forms. Students can make verbal responses, signal "true or false" by pre-arranged finger signals (one finger held close to the throat for "true", two for "false"), or answer silently within their own minds. If their minds are active, their attention is focused where we'd like it to be.

Development

The chapter on development helps put learning in perspective at various ages. The infant in us learns from active experimenting with the things in his world. We never really stopped learning that way even though our teenage learner became more able to learn abstractly. Just as some people learn best by left brained verbal modes and others by right brained visual channels, many people continue to learn best from hands-on experiences. Some of us do achieve the more abstract reasoning levels that Piaget spoke of, but many may remain solidly in the concrete levels of thinking. Again bringing back our concepts to concrete examples and allowing active learning experiences satisfies the infant, the schoolchild and the adult in us- more reason to vary our teaching programs.

Our adult students are more likely to be at a stage where the recall of facts is slowed down, but their ability to find deeper meanings is increased. Facts presented in context allow them to work with their strength which is analysis and synthesis of information. I try to focus on having my students understand the larger picture, even if they forget who developed the

theory and what specific terminology is associated with the concept. I am trying to deliver usable information that students can apply to their lives. Knowing how to make a usable behavior modification plan is more important to me than knowing the terms positive and negative reinforcement and positive and negative punishment. I try to construct tests to require not only the skills of recall of terms and facts in objective questions, but also the ability to describe the deeper concepts in the information we have studied by asking them to write at length about significant material.

Learning

The learning chapters of psychology textbooks cover basic information about learning that we've probably known from our own infancy, though not with the theoretical background and fancy terminology added by texts. Classical and operant conditioning have shaped us and our responses. Students work for praise or grades, or even better for feelings of accomplishment. Most teachers instinctively give praise, not punishment, to people who give correct answers, thus incorporating the operant principle that positive consequences make it likely that the person will continue to give correct answers whenever possible.

On the negative side of conditioning, conditioned emotional fears also can cause some students to develop test anxieties which interfere with recall during tests, compounding as failures pile up. We can help by offering experiences that will counter those fears: relaxation techniques to calm the student, alternative testing sites to avoid the "catching of fears" from others, better study techniques, or alternative assessments. All these help the student to not only regain control but also overcome their conditioned fears.

On the Social Learning Theory side, we do hope that we model positive behaviors and attitudes that students will adopt. Knowing that the behaviors of warm, caring models are more often adopted may influence the quality of my interactions with students. I try to create relationships that will encourage students to adopt my well meaning, carefully considered, cherished beliefs about how the world works. But I also realize that their reality differs from mine and they must construct their own reality. Classical, Operant, and Social Learning principles remain background truths which shape teaching in basic underlying ways.

Memory

Learning how the memory works, on the other hand, has given me lots of reasons to think about the way I teach. The physical process of constructing memory links in the brain gives specific indications of helpful teaching methods.

Incoming information from our senses floods into a holding station deep within the brain called the hippocampus. This curved collection of thousands of neurons was given the Greek name for seahorse because of its seahorse-like appearance, and is pronounced as you would a college setting dedicated to water loving mammals- a hippocampus. It seems to stay there waiting for enough information so that the brain can in some mysterious manner decide in what part of the left or right cerebral hemisphere similar information is stored. Our concept of an orange may be split up into its shape, color, texture, taste, smell and even the appearance and sound of the word "orange." Each of those parts of our whole understanding of an orange is tagged for storage in a different part of the brain. Memory researchers think new incoming information may sit in the hippocampus for hours, days, weeks, months, or even years before sufficient clues indicate the proper area for its storage. Then the memory is zapped to its proper place in the outer levels of the brain to be held until needed.

This has two indications for me in teaching. It tells me that repetition is usually helpful. The more someone hears and sees information (maintenance rehearsal, in formal terms), the more likely the information will be stored in the long-term memory. The second way in which I might ease the work of the hippocampus in deciding where in the cerebral hemispheres to store this incoming information is by saying it in different ways or giving concrete life experience examples (elaborative rehearsal). Asking students to think of examples from their own lives is an even more efficient way of getting neurons to more quickly determine a proper storage spot. Connecting the information with previously learned material ensures the deeper processing that will make incoming information more meaningful and more readily stored in memory. I can almost picture rings of cerebral neurons containing similar materials telling the hippocampus, "That's our kind of stuff – send it up here. We can give it a good home!"

Some of our more right brained students might find that visualizing information helps them to work with their strengths in getting material "memorized." Using words which create a vivid mental picture of a concept will teach students the usefulness of the process and encourage them to do the same, retaining more of what you're teaching. For lists of difficult to remember material, memory tricks can help, such as "HOMES" for the Great Lakes or "Every Good Boy Deserves Fudge" for the lines in a staff of music. I came up with the idea of teaching "DABDA" (Denial, Anger, Bargaining, Depression, Acceptance) as the memory cue for Eliza-

beth Kubler Ross's stages of dealing with death or loss, after seeing it written in the margins of many test papers as the student's memory jogger. If we want to make learning easier, we can teach students the memory enhancing methods available to them.

Earlier in the article, I tried to set you up for just such a process when I gave you the Greek meaning of the name for the part of the brain which does the initial storing of memories. Do you remember the name for it? If you made a mental connection either with the shape of the structure itself or with the aid of the water-loving mammal college idea, you had a better chance of storing the word hippocampus for recall. And now that you've encountered it a third time, repetition has also helped to increase the chance that you've stored it for future remembering.

Some information seems to get processed automatically - no repetition or in-depth analysis necessary. This may be because the hippocampus is snuggled up close to the emotion center of our being. It may be difficult for us to compete with the laying down of precious family memories or flashbulb memories of events like the Challenger disaster, but we can try. Probably at least a few things that we teach in the semester might cause an emotional "wow" that shoots them right into effortless permanent storage. Using humor, which evokes pleasant emotions, might facilitate this happening sometimes. Not all learning can be stored that easily, but we can hope to transfer those things we found profoundly important in a way that touches the same response in our students.

Stress inhibits the memory process at all stages, both in initial learning and in ability to recall information. Think back to a test you took in your earlier career as a student, when that blocked answer to question 7 waited uncooperatively in the corridor, only to jump gleefully into your consciousness the moment you dejectedly closed the classroom door. Stressed people don't learn or remember as well, so I strive to have as stress-free a classroom as possible.

The first class of each semester always has an introduction time - sort of an initiation exercise that people have to get through so they can say, "Whew" and know nothing worse will probably come. Like a muscle held tight and let go, students automatically relax. The student's first task is to fill out a note card with the usual information then some "personal" information about family, job, hobbies, pets. The cards give me a way to learn names afterwards, but when the student holds it during introductions, they have as I put it, "A cheat-sheet" in case they forget their names when

introducing themselves. Students learn things about each other, about me during my introduction, about fear of public speaking being the world's most common phobia, and about the power of humor to make the classroom more comfortable. Everyone has raised their voice to speak and broken the silence barrier, and hopefully has even found someone they'd enjoy talking with in the Falcon Room at break. This exercise helps set the classroom atmosphere for the rest of the semester. I trust that learning is improved when students know and feel comfortable with each other and perceive me (I hope) as an easy-going, approachable person who is their ally in learning.

By using memory-friendly delivery processes, I hope that the information I present will more easily find a good home in the cerebrum, linked with the group of similar concepts in each perceiving student's brain.

Motivation & Emotion

These sections in the psychology texts always focus me a bit more clearly on student needs. Maslow's pyramid of needs says that basic needs must be satisfied before a student will be receptive to my neat little lecture on motivation. A student who fears eviction because he can't afford this month's rent is going to be focused on his safety needs and unable to focus on how understanding Maslow's pyramid will contribute to his self-actualization. If I know that a young mother is worried about a sick child, I know her attention will be minimal even if her body is physically present in my classroom. I know to check to see that she knows where to get the information she may have missed when her attention was elsewhere. I can't solve all of the life problems that may intrude on a student's ability to learn but I can be as helpful as possible in seeing that the opportunity for learning is still available and keep that motivation for achievement alive.

I try to be infectious in my enthusiasm for the material I am teaching. If I don't display interest and enthusiasm about fresh new findings, my performance will lack the spark that may keep the students' attention focused longer; I've failed to be a role-model that encourages them to be constantly on the look-out for psychological information helpful to them in their family and professional lives.

One of my pet issues in teaching about motivation is a concept by a psychologist named Julian Rotter (and I only name him because he needed his own concept of a healthy Internal Locus of Control to overcome his name). He felt that Locus of Control was a central issue in explaining how people viewed their ability to control their lives. People with an Internal

Locus of Control feel like "the captains of their ships," able to make decisions that determine their life course. Those who held an External Locus of Control lived with a "You can't fight City Hall" outlook, leading to a helpless, hopeless frame around their lives. I try to help my students develop responsibility for their successes and failures in my class (and strengthen their Internal Locus of Control) by clearly stating expectations and evaluative criteria, by giving choices as to evaluation methods, and by being specific about how work could be improved. Some of our students have come from backgrounds which did not allow them to feel much control over their lives and it is very important that their college experiences leave them feeling very much more in control of their destinies.

Standing in front of my class, I'm often very aware that the process of motivation isn't a one way street. Those students who laugh at my jokes and maintain eye-contact even during through the tough (boring to me?) concepts, motivate me to keep trying. Those "responders" give me the energy to continue to try to reach the "desk inspectors", the students whose eye color may still remain a mystery to me at the end of the course.

By responding to those things that "ring true" in their lives, I am- as Deborah Kerr sang- being taught by my students. They, in concert with my subject matter, help me to shape my class into its most usable form for them.▼

Diane Chin

This is true, but not fact. That's probably because from the vantage point of more than 20 years later, I can remember only the feelings, perceptions, and the perception of perceptions, not the specific details of actuality. I'm sure many will find the situation and my reactions humorous, but I didn't then and don't now. At the time, it never occurred to me that this would be one of those "We'll-look-back-on-this-and-laugh" things. It still doesn't. So though I may see the inherent humor and consequently tell it funny, I'm not laughing, and though I may see the value of the lessons I learned as a teacher, I'm not appreciative.

When she sauntered into my classroom, I was just about to write my name and the course name and number on the board, as all instructors do on the first night of class. Course name: Freshman Composition; Course number: EN100; Instructor: _____? "What would I put now? Diane Chin?" What would I put now that she's here? Five minutes before, I was an adult, a grown up, a professional, an enthusiastic English instructor at Northern Essex Community College, stimulated by the prospect of teaching my first College Composition course. That's who I was five minutes before, before MY MOTHER plunked herself in a seat in the middle of the middle row. Who was I now?

Deliberately nonchalantly, I turned around back to the desk and checked the class roster that I hadn't looked at yet. "Yup, there's her name." With that verified, I began the familiar regressive transformation process, and Betty's daughter turned back to the board and heard the chalk leave her name there in yellow. I didn't look to see what I had written; I didn't want to know.

She saw me see her and waved. I smiled and faked a look of happy surprise. Evidently, my curious eyebrows asked the question, because she mouthed the answer, "I thought it would be fun." She thought it would be

fun. I kept smiling. Of course. It would be fun. Why didn't I think of that? Just why didn't I think of that myself. She was a student at NECC, had gone back to school to get a degree and, of course, needed English credits, so I should have thought "it would be fun." I could have been all excited and said, "Guess what, Mom? I got my first job teaching college composition!!! I'm so happy, and I know I can really do well. And the only thing that could make this better would be if **YOU** were in the class? What d'ya say? Wouldn't it be fun?"

Here's something I found out about me that night. On the outside, I could be a teacher, handing out a syllabus, discussing methodologies, assignments, readings, expectations, grading, writing process, and on the inside, an absolute raving lunatic: THIS IS MY WORST NIGHTMARE. NO. NO. I COULDN'T HAVE DREAMED THIS NO MATTER WHAT I'D EATEN. THIS ISN'T EVEN IN THE REALM OF SCIENCE FICTION POSSIBILITY. ABDUCTION BY ALIENS IS LOOKING PRETTY GOOD RIGHT NOW. CAN'T SHE SEE THE POSITION SHE'S PUT US IN HERE? LOOK WHERE SHE'S SITTING - IN THE MIDDLE - SO EVERYTHING CAN REVOLVE AROUND HER. WELL, THIS IS MY CLASS. I'LL JUST CHANGE THE SEATING ARRANGEMENT. OH I GET IT... THIS IS AN ULTIMATE TEST OF CONTROL. WHY ELSE WOULD SHE THINK THIS WOULD BE WORKABLE FOR US? ORRR... THERE'S SOME SPECIAL CONSIDERATION SHE WANTS OR THINKS SHE'LL GET IF SHE'S IN MY CLASS? OH WAIT ...I KNOW... SHE'S AFRAID I WON'T BE ABLE TO FUNCTION IF SHE'S NOT HERE TO TELL ME EVERYTHING I DO WRONG. IT'S JUST HER USUAL MOTHERLY CONCERN. WELL, YOU KNOW WHAT, MOM? YOU WERE NO DONNA REED. YOU DIDN'T VACUUM IN HIGH HEELS. I MUST HAVE MISSED THAT EPISODE, THE ONE WHERE MARY BECOMES A TEACHER AT A LOCAL COLLEGE AND DONNA DECIDES TO BE IN HER CLASS, AND THEY HAD "FUN". BUT YOU MUST HAVE SEEN IT AND DECIDED THAT WE COULD "HAVE FUN" TOO. TOO LATE. YOU SHOULD HAVE BEEN WEARING A DRESS TO DUST ALL THOSE YEARS... SO NOW JUST WHAT AM I SUPPOSED TO DO? NEVER CRITIQUE HER? TELL HER HOW GREAT HER WRITING IS, NO MATTER WHAT? JUST GIVE AN A? OH WAIT! I KNOW! I'LL JUST MAKE A DRAMATIC ANNOUNCEMENT NOW: "CLASS, I'VE REALIZED THAT THERE'S SOMEONE MUCH BETTER THAN I TO

GUIDE YOU THROUGH KATE TURABIAN, SOMEONE WHO WILL ZERO IN IMMEDIATELY ON ALL OF YOUR WRITING DEFICIENCIES, AND THEN MODEL FOR YOU THE FUN WAY TO MAKE EVERYTHING YOU WRITE PERFECT THE VERY FIRST DRAFT. SO NOW I MUST STEP DOWN AND TURN THE CLASS OVER TO BETTY. I KNOW YOU ALL KNOW HER AS THE STUDENT IN THE MIDDLE SEAT IN THE MIDDLE ROW, BUT SHE IS REALLY... MY MOTHER."

After much of a blur, class was over. I heard my cool, calm, pleasant yet professional voice proclaim it. "Thank you for your attention. See you Thursday. Don't forget your brief reaction essay to the reading on page 40." I wondered if the liquor store was still open (They didn't sell wine in the supermarkets back then).

I was all too soon sorry I didn't stop to get a few bottles and drink them all and pass out. I might have missed the 11:30 phone call that night. Oh, I've had students who've called me at home since that time, but never that late, and only in the case of an emergency. But, oh forgetful me! SHE HAD AN EMERGENCY: she wasn't tired so she thought she'd do her essay, but she didn't know how. "Well, you know, Mom, we went through this in class..." I revisited the class discussion and activities. She decided that I was obviously too tired to help her then, actually apologized for calling so late. "I know you're a morning person, Di. You can help me in the morning," she said in her chipper voice.

"...In the morning" it all became clear: why her attitude had changed last night, why she wanted to be in my class, and why she didn't seem to see the implications of this for us. The night before, she didn't accept my review of the class as helping her, and she figured that it was probably bad timing on her part. I'd be much more willing and mentally able to "help her" in the morning, I'm sure she was sure.

What should she write? She didn't know what her reaction was? Yes, she understood it; did I think she was stupid? (Bad move, Diane.) Well, she kind of thought this... or that... (after I began feeding her specific content). But what should she write about it? I realized I was asking all the wrong probing questions; in fact, I wasn't supposed to be asking questions at all. I was supposed to be "helping her," which it was becoming all too clear meant telling her what to write, telling her how to write it, and essentially doing everything except handing it in to myself in class. In **HER** eyes, "that was what any <u>good</u> teacher would do" - a heck of an

oversight from the faculty orientation package, I'd say. And so it was that the fifteen week spring semester of EN100 Freshman Composition, section 10, began with a simultaneous bang and whimper. "Mom, what if you were in one of your other classes and a paper were assigned, would you expect the teacher to tell you exactly what to write, just dictate a paper to you?" No, of course not, but she would expect them to at least teach her how to do it, (WHICH I AM APPARENTLY INCAPABLE OF DOING, the lunatic inside added), and besides, she continued, papers for other classes "are about, you know, subjects; these aren't" "Oh Yes, they are!" "Oh No, they're not!" I felt like if I just looked at her and, out of the blue, said, "black." She'd spontaneously say "white." "Day." "Night." "Summer." "Winter." "In." "Out." We were entrenched. So I did whatever it was I was doing instead of teaching her again, and again, and again, in class and out of class, in my kitchen, in her kitchen, on the phone, in the car, morning, afternoon, and night, Sunday to Sunday, throughout the entire semester. The veneer of an English instructor on the outside of me was exhausted and frustrated, not because it was your typical student/teacher conflict, neither was it even your typical mother/daughter conflict, but because it was your typical Betty/Diane conflict. It was, in fact, a conflict that began when Diane was in seventh grade and preferred to take a detention than to bring an absent excuse note which Betty would not rewrite that said, "Please excuse Diane's absence from school yesterday, I kept her home in bed with a bug." The comma splice was the least of the humiliation.

So now, 20 years later, the grown up Diane who was teaching the class found herself racing Betty's daughter to the surface in response to Betty's needs. Unfortunately, the grownup was always too slow. Betty would state, rather innocently, "I don't really have time to type it, Di. And it's not really fair because I'd make so many typing errors." So then Betty's daughter would pout back at her, "Well, you have to type papers in every one of your other classes. Do you give your other teachers grief about it? Besides, if I say you don't have to type, then I have to say nobody has to type. Then, they'd fire me because I didn't require students to maintain certain acceptable practices. THEN, where would YOU be?" "They wouldn't fire you for that." She was right, of course. What would have made "them" fire me, however, is when they found out I was really only 12 years old.

All of this could have been avoided if the grownup instructor had spoken up and presented the bottomline: "It's standard to type everything at

this level." Where was that grownup when I needed her? It was hard enough for me to be the authority figure anyway, and trying to make sense of what was happening between Betty and her daughter was a truly unfair burden.

I found myself questioning everything I did, both in class and out. No place was safe, and no other aspect of my life was designated as unrelated. "Mom, I'm confused about how what you've written here supports your main point." "You know, Di, in class the other night I was noticing those navy blue slacks you had on seem a little tight on you. I don't think they were last year." That evidently was why she couldn't achieve unity in her essays. The scary part was that it started to make sense. I could actually find some correlation between my weight and her inability to establish relationships between and among her thoughts. "Excess weight means putting food into my stomach that shouldn't be there either because it's the wrong food for various reasons or it's more food than I need. Therefore, I am a walking personification of a bad essay." I bought new pants. It didn't help.

I suppose I could have adopted an easy methodology of just letting her write a first draft, then verbalizing for her how to improve it, instead of being hellbent on her practicing the revision process herself. "Put a comma here. Add X here; move Y here; say Z here; spell recieve with e before i." It would have been so much less nervewracking. Both my mother and I would have been much happier. We might even have had "fun." But I didn't succumb. To me, the successful finished product was only the result of successful process, and the learning experience.... and, most important, I AM A GLUTTON FOR PUNISHMENT, the lunatic screamed at myself.

I made several thwarted attempts to convey that this wasn't working. "Mom, I'm not doing this for the other students, do you really think it's fair that you get so much assistance.?" I learned, but not quickly enough, that there are two potential, yet equally treacherous, responses: 1. "Do you mean you wouldn't help the other students if they asked?" or 2. "That must mean I'm not as smart as everyone else." It was like taking a test to which there were no right answers.

One time when, as usual, I was not "helping" her, I suggested that, even mid-semester, she should consider transferring into another section. I was sure I could work out some arrangement with another instructor. The lunatic was advocating for me inside, SOMEONE HERE WILL SURELY

UNDERSTAND MY PROBLEM; THEY'VE ALL GOT MOTHERS. Well, she didn't want to leave my class, she just wanted me to care whether or not she failed. I DON'T CARE WHETHER OR NOT SHE FAILS!?! THAT'S LIKE SAYING I DON'T CARE WHETHER OR NOT I CONTRACT LEPROSY. AT LEAST SHE CONCEDES TO MY AUTHORITY HERE. SWELL. WON'T THAT MAKE FOR HAPPY CONVERSATIONS AT FAMILY GATHERINGS FOR YEARS TO COME? NO ONE WILL EVER HAVE TO WONDER WHAT TO PUT ON OUR TOMBSTONES:

I DON'T CARE WHETHER OR NOT SHE FAILS!?! SHE JUST DOESN'T GET IT.

So I had to get a grip. I had to figure how not to do her work and keep my assistance to her within a range that was fair to the other students; how to grade her objectively and minimize the consequences of my evaluations of her papers to me; how to keep her from failing and keep my sanity at the same time. I had to figure out how to stay in control of the situation. Piece of cake! As I look back now, I can see that what I viewed then as tactics or coping mechanisms to enable my survival of this situation evolved into the very strategies and methodologies I use today as a writing teacher, which I feel promote student success and the learning process and are, in fact, now the norm in writing classes. Perhaps I would have come to practice my trade in this way over the years anyway. Perhaps, as I continued teaching, I would have experienced more of a trial and error

process. Perhaps, but I hope not, I would have stayed stuck in old outdated methodologies. I guess I could say that because of the crash course I took that fateful semester, I ended up a bit ahead of my time.

I allowed students to do rewrites of their work and I gave them the highest grade they chose to achieve. I changed the way I gave feedback to conferencing for suggestions, and provided only suggestions as written feedback until the student chose when he or she wanted to be graded, within set time frames, of course. I dropped my prejudice that I shouldn't have to teach grammar, punctuation, spelling etc. at this level, and I started to incorporate some little common error mini-lessons. I had students devise their own checklists for editing based on their previous process work. I constructed little style activities, like looking at each other's essays to find places where adjectives could be added, or to find two or three sentences that could be combined into one through some embedding techniques. Then we translated these activities into revising their own essays.

I began a process of peer quality control groups for writing. I facilitated small group, problem-solving sessions with students who were stuck on what to write or how to write it, while other peer-editing processes were taking place. I began to ask students what they wanted to convey to the reader. I let the readers, other students in the class, ask questions about what wasn't clear and make suggestions about how the writer could have written it so that it would achieve the writer's intended effect. They talked about their writing, then they wrote, then they talked and wrote some more. It seemed that the class perceived, my mother included, that if I devoted class time to these activities, then they must be worth doing as regular steps when writing - an unexpected effect, when all I wanted was for my mother to pass the course.

A person whose frame of reference includes only current and more recent writing pedagogy wouldn't appreciate that this was innovative, yet in the mid-seventies, it was. Somehow, though, I NEVER FELT the least bit inclined to thank my mother for the invaluable experience. While the outside of class demands on my time that my mother made were not alleviated, I had managed to create a class environment in which if my mother wanted to tell me that my pants were too tight, then she had to tell several of her peers that theirs were too. Worked for me. Also the grownup inside got a little faster when she had the security of some scripted dialogue to rely on. "Okay, well, let's just bring this up in your peer group on Tuesday."

The lunatic inside rechanneled some of her efforts too. Not that she didn't rampage frequently, but she actually generated some good ideas from time to time. SHE DOES WELL IN ALL OF HER OTHER CLASSES. I DON'T GET IT. OH YES I DO! ALL SHE DOES IN THOSE CLASSES ARE ART PROJECTS. SHE DOESN'T EVER HAVE TO WRITE ANYTHING.

NO WONDER SHE CAN'T FIGURE OUT FOR HERSELF WHAT TO DO HERE. SO I'M SUPPOSED TO MAKE MYSELF CRAZY TRYING TO... Then the grownup would pick up on a key word or phrase, "Whoa. Wait a minute. Did you say all she does is art projects?" YES I DID, AND I'M SICK AND TIRED OF REPEATING EVERYTHING TO HER AND TO YOU. WHY DOESN'T ANYBODY LISTEN TO ME... But while the lunatic was still screaming, the English teacher would say, "Mom, you're an artist. How do you get your paintings to say what you want them to say?" I still wasn't "helping her," of course. But she was beginning to relate verbal expression and writing process to her more familiar and comfortable means of expression, painting. She was beginning to interact with her thoughts through writing as she had always interacted with visual images through painting. She was beginning to experience success in her writing as she had experienced success in her paintings, and this encouraged and empowered her. Most important, we were getting through the semester, which was my primary goal at the time. "IF I CAN JUST GET THROUGH THE SEMESTER, I'LL BE OKAY; I'LL GO BACK TO WAITRESSING AND FIND PEACE AND HAPPINESS SOMEHOW AGAIN." (I'd also like to credit my mother for my flair for melodrama.)

My mother earned a B for the course; she had worked for it; she deserved it. We never spoke of the class again. Once though, about a year later, one of her instructors happened to mention to me that he had given an option of doing a paper or another type project for an assignment. My mother had chosen the paper and did a nice job on it. The grownup inside thought I should mention to my mother that she had been complimented so highly, but Betty's daughter wouldn't do it.▼

ASSESSING STUDENT PARTICIPATION USING PERFORMANCE CRITERIA

Paul Marashio

In Search of a Way

Many faculty expect students to participate in class discussions. Yet, syllabi often cite only quizzes, exams, papers, and projects as the sole means for student assessment. The probable reason for this grievous oversight is the instructor's insecurity on assessing something apparently too subjective.

For many years I assessed student discussions in a nebulous way, causing me great discomfort because of my uncertainty with grading a student for class discussion. This ambiguous approach introduces too great an extreme of subjectivity into the student assessment. Such an approach to grading is a crisis waiting to be born.

Assessing student participation is not for the faint of heart. However, instructors like myself who thrive on class discussions must gird ourselves for the awesome challenge of creating better ways of assessing student participation. The major bug-a-boo is the lack of clearly defined and specifically written performance criteria.

Since many instructors develop and implement performance criteria for lessons, units, and courses that guide the content, methods, and assessment, why not apply the same tactics to student participation? With this thought tugging on my mind I responded, why not! I thought hard and long about performance criteria, but my uncooperative subconscious was reluctant to surrender any criteria. After a time the subconscious grudgingly surrendered a few obvious performance criteria, primarily in the frequency of participation area.

After an incubation period of a couple days I was back at the task again, in hope my subconscious would cooperate. I began this phase of the search with a revision of my original premise and asked, What elements make for a good class discussion? This question freed me to visualize an ideal class discussion with every student interacting with each another. Sitting in the circle with the students is the instructor facilitating, orchestrating the discussion. I witness students conversing and even debating with each other, fully engaged in both the subject's content and the discussion's

process. Students are talking. Students are listening. Students are gliding along the edges of the topic. Eventually they travel deeper into the material's interior, taking greater risks as they progress through each layer transposing the murky substance into a meaningful clarity. There are students who volunteer, other students who are coaxed into participating, and a few students who are directly requested by the instructor to participate. One student might stray off course, temporarily disrupting the steady flow and orderly continuity of the discourse. Either the participants or the instructor gently nudges that straying student back into the discussion. Naturally, there are times when a straying student takes the participants down an appropriately untraveled road that links the material in a relevant way offering new insights to the discussion. This is a delicate judgement call by both students and instructor. During a discussion every participant is actually discovering what they think. Every student's comment fuels new insights, new discoveries. Throughout the discussion students are breathing life into the content, displaying knowledge and understanding of the content. During the discussion, the students process the content, formulate ideas, contribute views, and build on other students' input. They are engaged with each other and with the material!

Discovering Participation Performance Criteria

From this vision of an ideal class discussion, I was better able to coax my subconscious to relinquish a listing of participation performance criteria. Initially, I listed all criteria that now flowed easily from my subconscious to my conscious self. When I exhausted my criteria, I reviewed the inventory for "keepers". Once completed, I refined the language. The following is my performance criteria inventory;

- Preparation
- Demonstrates knowledge
- Understands material
- Organization
- Listens to others
- Attentive to the process
- Applies content to concepts/ideas
- Offers well-reasoned responses
- Forms reasonable, defensible interpretations/analysis
- Builds on contributions
- Frequency of participation
- Decreasing/Increasing

- Attentive
- Cooperative
- Volunteers

Assembling A Student Participation Profile

Even with the completion of this phase of the process, I was not satisfied. So what if I had an inventory of appropriate performance criteria. What was I going to do with them? How was I going to use these criteria to evaluate student participation? Something was not right. For me this assessment model was incomplete. An inner voice kept nagging me to find a way to complete this model so it could more easily assess student performance. At once I recognized I had to translate the criteria into a model, an instrument. As I continued to review my performance criteria, I detected a pattern of recognizable categories - Content, Process, and Participation. At that moment, I struck upon the idea of a Student Participation Profile to assess student performance. Once again, I studied the performance criteria to determine the placement of each under its appropriate category. Afterward I applied a sliding scale of 1 to 5, with 1 low and 5 high, to assess the student's performance for each criterion. Lastly, I decided to assess student participation four times during the semester to give me an even more accurate and objective assessment of the student's progress.

Student Participation Profile

Student		
1 = Low — 5 = High	Plot Legend: ① ② ③	
Content (what student says)	**Process** (how student presents it)	**Participation**
Preparation 1 2 3 4 5	Organization 1 2 3 4 5	Frequency 1 2 3 4 5
Demonstrates Knowledge 1 2 3 4 5	Listens to others 1 2 3 4 5	Increasing/Increasing 1 2 3 4 5
Understands Material 1 2 3 4 5	Attentive to the process 1 2 3 4 5	Attentive 1 2 3 4 5
	Applies content to concepts/ideas 1 2 3 4 5	Cooperative 1 2 3 4 5
	Offers well-reasoned responses 1 2 3 4 5	Volunteers 1 2 3 4 5
	Forms reasonable, defensible interpretations/analysis 1 2 3 4 5	
	Builds on contributions 1 2 3 4 5	

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Applicability of the Student Participation Profile

The student participation profile serves multiple functions. Since the profile specifically identifies those appropriate behaviors for a good discussion, I share the Student Participation Profile with the students during the first class orientation so they are fully briefed on the expectations for class participation. Now the students better comprehend their responsibilities for a good classroom discussion. Also, they know up-front the criteria they and the instructor will use for grading student participation. The students are given voice in the grading through quarterly self-assessments tracking their progress through the Student Participating Profile. At the semester's end, these profiles are turned in to the instructor who in turn uses the instructor's profiles alongside the student's self-assessment to calculate each student's participation grade.

Another significant use for the Student Participation Profile is as a faculty growth instrument. There are no evaluation instruments I am aware of that effectively evaluate a participatory class. For me, it is important to obtain feedback from an impartial observer on how well students are achieving the performance criteria. Evaluating a class discussion is difficult. Oftentimes an outside evaluator is baffled by the apparent unstructured format of a discussion class/seminar. This haunting ambiguity of not knowing what to look for or how to observe and thus evaluate the discussion further heightens the evaluator's insecurities which only constrains the evaluation. However, the Student Participation Profile eliminates the ambiguity by giving the evaluator a concrete set of criteria to work with during an observation. With the aid of the Student Participation Profile the observer/evaluator is able to zero in on the class discussion offering a helpful assessment to the instructor on how effective class participation was on that day. This Participation Profile can only help the instructor do an even better job of guiding student discussions.

Students Endorse the Participation Profile

In their endorsement of the Student Participation Profile, the students stated the profile displays clear and specific expectations for class discussion and provides an excellent tool for them to chart and track their progress throughout the semester.

Students expressed the following comments on the advantages of the Participation Profile:

* *"It made me think each quarter about what I was really doing in class."*
* *" . . . . a good tool to actually visualize my progress. It also gave me insight into areas I need to improve."*
* *"I found it interesting to compare my scores at the beginning of the semester to the scores now."*
* *"It helped me to improve."*
* *"This form is helpful for those of us who need a visual for 'The Big Picture'."*

Naturally, I was elated with this positive student feedback. Prior to my development of the Student Participation Profile, the students had no clear idea what was required of them in a discussion - except to discuss. Often, they erroneously believed frequency of participation was the sole criteria for grading participation at the expense of other significant performance criteria. With the Student Participation Profile, the students for the first time have "The Big Picture" in their hands. Quickly the students comprehended that all three categories - Content, Process, Participation, are necessary for an engaging exchange of viewpoints. In addition, through quarterly assessment, the students learn what performance criteria are essential for a good class discussion, the criteria for evaluating their progress, and where they are strong and what they need to fix.

The Profile Advantage

In conclusion, by establishing performance criteria for participation the guesswork is taken out of the grading. What was previously a dangerous grading minefield is now a concrete grading safety zone where I can more accurately assesses student participation. The wide chasm between subjectivity and objectivity is bridged. As a result students are graded even more accurately, and consequently more fairly. For me, one overriding advantage to the Student Participation Profile is the increased confidence I have gained grading student participation. Even more importantly, since students understand what performance criteria are essential for a good discussion, they come to appreciate and value the elements of class discussions and thus become better participants.▼

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WHAT DETERMINES A STUDENT'S FINAL EXAM SCORE IN A PRINCIPLES OF ECONOMICS CLASS?

Ronald W. Olive

I. INTRODUCTION

Economics is generally considered a difficult subject to master. Beginning students of economics quickly discover that the theory, the graphs, and the equations can be formidable. It usually takes several weeks of instruction before students start to get "the hang of it."

To soften the blow of studying economics, instructors try to use a well-regarded text, a study guide, and, hopefully, a teaching style that is not overly pedantic.

Most instructors also "teach from the text." That is, they follow the text material rather closely.

In spite of the usage of good textbooks, study guides, and relaxed teaching styles, students of economics struggle. Some are ill-equipped mathematically, others have poor study habits, and, beyond most economists wildest assumptions, some students may just not have any interest in the subject.

The purpose of this paper is to analyze the factors that may determine a student's success in sitting for a final exam in economics. The next section will review the theory of why a student may be successful in sitting for a final exam in economics.

The third section will present the data and model to be tested. The fourth section will present the statistical results of testing the model. Finally, the fifth section will provide concluding remarks.

II. SCORING HIGH ON AN ECONOMICS FINAL EXAM

To do well on an economics final exam, a student must study hard, come to class, ask questions, work through the germane study guide chapters and sections, and possess a positive attitude.

During the semester a student should pay attention to an instuctor's inclass exams, that is, the format of an inclass exam. Usually, but certainly not always, an instructor's final exam will follow the format of his regular semester exams. Mastering the kind of exam an instructor gives is certainly important.

To perform well on a regular semester exam, a student should have read and understood the chapter material. To test his chapter material comprehension, a student should diligently work through the relevant study guide chapters. Only by testing himself in this way will a student know if he is understanding the chapter material.

If an instructor also assigns homework or problem sets, a student would be well advised to work through each assignment on his own before turning to a classmate for assistance. Simply copying another student's answers defeats the purpose of the assignment.

Lastly, needless to say, class attendance is extremely important. It is here where the instructor can be most helpful to the student of economics. The theories, the graphs, the equations a student encounters in the textbook, the study guide, and on the problem sets can be explained here by the instructor. Any questions a student needs answered can best be handled in class, in front of other possibly confused students.

III. THE DATA AND THE MODEL

To express the theory of doing well on an economics final exam in equational form, we can write the following:

1) FINAL = f(ABSEN, SCORE, HMWRK)

where FINAL = numerical score on the final exam
ABSEN = number of missed classes
SCORE = average numerical score on inclass exams
HMWRK = average numerical score on homework assignments

It is expected that both SCORE and HMWRK affect FINAL positively and ABSEN affects FINAL negatively. In other words, higher scores on inclass exams and homework assignments will lead to a higher score on the final exam. Conversely, a higher number of missed classes will lead to a lower score on the final exam.

Expressing equation number one in an econometric form, we can write the following:

2) FINAL = b1 + b2*ABSEN + b3*SCORE + b4*HMWRK + e

where the variables are as defined above, the b1, b2, b3, and b4 coefficients are to be estimated, and e is a stochastic error term with mean zero and constant variance.

Data for the model was taken from two principles of microeconomics classes at New Hampshire Community Technical College, Nashua, New Hampshire, taught during the fall 1995 semester by this author.

Twenty-five students sat for the principles of microeconomics final exam. Final exam scores ranged from a low of 39 to a high of 95. The mean score was 63.96. During the semester four inclass exams were given and twelve homework or problem sets were completed by the students. Classroom attendance ranged from no missed classes to 15 missed classes. The mean was 4.04.

IV. RESULTS

The econometric results of estimating equation number two by ordinary least squares are presented below. The t-statistic is beneath each coefficient value.

3) FINAL = 3.357 - 1.165*ABSEN + .763*SCORE + .139*HMWRK

(-1.875) (3.143) (.686)

R2 = .65	n = 25	df = 21
SER = 9.755	F = 12.915	p = -0.403569

Each explanatory variable has the hypothesized sign. The coefficient values on ABSEN and SCORE are statistically significant at the 5% and 1% levels, respectively, using a one-sided test. The R2 statistic tells us that the three explanatory variables explain 65% of the variation in the final exam numerical score. For cross-sectional data this R2 value suggests a relatively "good fit." The F-statistic is a statistic to test the overall significance of the estimated equation, and is statistically significant at the 1% level. The standard error of the regression(SER) and rho(p) statistics can be utilized to tell us more about the estimated equation, if need be.

The coefficient value of -1.165 on the ABSEN variable can be interpreted as follows: for each successive missed class, a student's final exam numerical score in economics decreases by 1.165 points on average, other things equal. On the other hand, the coefficient value of .763 on the SCORE variable can be interpreted as follows: for each additional average point increase on inclass exams, a student's final exam numerical score in economics increases by .763 points on average, other things equal. The small coefficient value on the HMWRK variable, .139, and the statistically insignificant t-statistic lead one to conclude that homework assignments did not affect a student's performance on the final exam in the two classes that make up this sample.

The model's predictive ability can be shown by substituting values for each explanatory variable into equation number three. For example, the student who scored the lowest numerical score on the final exam, 39, also

missed 15 classes during the semester and had average scores on the inclass exams and homework assignments of 57 and 53.5, respectively. Substituting these values into the equation and solving, yields:

4) FINAL = 3.357 - 1.165(15) + .763(57) + .139(53.5) = 36.8

In other words, the model predicts a final exam numerical score of 2.2 points less than what our lowest scoring final exam student actually obtained.

V. CONCLUDING REMARKS

How well a student performs during a semester on inclass exams and classroom attendance both seem to yield favorable benefits with respect to a student's final exam numerical score.

A student who studies hard during the semester, and attends as many classes as he can, stands a far better chance of doing well in economics than the student who does not bother coming to class regularly and has poor study habits. Because economics deals with theory, graphs, and equations, obviously a "full plate" for today's community college student, one should attend all classes and set aside regular study sessions. Questions and confusing concepts can be addressed in class or in regular office hours by the instructor.

Finally, with respect to the insignificance of homework's impact on the final exam numerical score, this explanation can be offered. During the semester each student was encouraged to work with other students to complete the assigned homework exercises. The instructor noticed on more than one occasion identical, verbatim mistakes. If some students are simply copying other student's assignments, the educational benefit of homework assignments is significantly lessened. A remedy to this problem may be to schedule short quizzes in the class following the homework assignment. Hopefully, students will then realize that it is definitely in their interest to understand the homework assignment.

STUDENTS AS COURSE DESIGNERS

Nancy Marashio

In Fall 1996 New Hampshire Community Technical College in Claremont and the Richards Library in Newport piloted the collaborative course SARASH JOSEPHA HALE AWARD WRITERS. Our goal was to work toward answering what unifies the range of poets, nature writers, economists, historians, novelists, essayists and others who were awarded the Sarah Josepha Hale Medal. The final product of our class was a "paper" somehow threading together the likenesses of writers who had not been chosen for their likenesses.

We were fortunate in our class mix which included one member not only associated with the award since its 1956 beginning but also a member of the board of judges, two students studying for Associates in General Studies, one Respiratory Therapy student, a dual major in Occupational Therapy and Early Childhood Education, a Professor of Science, and me. All of us began in concern about our abilities to connectedly read such a range of writers, about the lacks in our literary backgrounds in approaching such an eclectic mix of writers, and especially about threading writer likenesses.

The Hale Award itself was our first unknown. As originator of the course I had learned about the Award as a student at Stevens High School in Claremont. I graduated from Stevens in 1960, and at that time when you came from Claremont you didn't have the connections to go to Dartmouth and listen to real writers. What I learned to do as a high school and college student was go to Newport every year and listen to the writer recipients of the Hale Award as they accepted their medals and then gave presentations to the audience, presentations that usually included readings from their published or in progress writings. I can honestly say that the reason I am teaching writing has a great deal to do with what the Richards Library has developed through the Hale Award. Barbara Holden Yeomans was the only other member of our class who had knowledge about the award, but what knowledge she brought to this class! Ultimately Barbara wrote the "Introduction" to our final paper. Her words brought the class into the Hale Award Writer world, and her words now are your introduction.

Introduction

For forty years, some distinguished writer associated with New England has traveled to Newport to receive our public library's annual literary

award, named for Newport's most famous native, Sarah Josepha Hale. The handsome bronze medal symbolizing the honor has been presented to fiction and non-fiction writers, poets, nature writers, scientific writers, historians, political scientists, biographers, playwrights and journalists.

Robert Frost was the first to receive the medal, Tom Wicker the most recent. It is interesting to realize that when Frost first came to Newport to read in the Opera House in 1956 the award had not yet been established. It was immediately after that Opera House reading that Raymond Holden, Newport writer, library trustee, and founder of the Friends of the Richards Library, conceived the idea of Frost's becoming the first recipient of an award designed not only to honor deserving writers but also to promote the Richards Library. Some months afterwards, Robert Frost returned to Newport to accept the first medal.

There is a board of judges who choose the award winner each year. It is not given for a specific work but rather for the body of the author's work. The only requirements, aside from literary excellence, are that the author or his subjects be in some way associated with New England, and that the nominee come to Newport to accept the medal and read or talk before a Newport audience.

Holden said, in introducing one of the early recipients, "At this time, the recipient brings more honor to the award than the award brings to the recipient. We hope that will not always be the case." Clearly, it is not. The distinguished list of medalists now includes thirteen Pulitzer prize winners, and carries its own distinction.

Because of the differences in the personalities of the speakers, the variety of their fields of interest and their styles of writing, each Sarah Josepha Hale Award evening until now has been unique and an event unto itself.

This year students have begun to take a retrospective look at the whole picture. Nancy Marashio,Professor at the New Hampshire Community Technical College, decided to make the Sarah Josepha Hale Award writers the subject of a course. Happily, she chose to have the class meet in the Sarah Josepha Hale Room of the Richards Library rather than at the community technical college in Claremont. Posters covering the walls are silent reminders of each year's speaker and have provided the perfect ambiance. Library tapes of the various lectures have been an additional bonus.

As one who has been associated with the award from the beginning and as a member of the board of judges since Raymond Holden's death, I was naturally very much interested in Ms. Marashio's innovative idea and asked to audit a class. I wasn't free until their third meeting, and after that first three hours I was hooked.

I've been pleased to be welcomed to the course, albeit on a somewhat different basis than my fellow students since I might well be the grandmother of any or all of them.

I was curious to see how Ms. Marashio would approach the study of such a disparate group of writers. I learned that, if there were common ground, she wanted each of us to find it for ourselves. The atmosphere of the class is relaxed, seemingly without pressure although each student is striving to do his best work. They speak frankly to one another, and there seems to be comraderie and friendly interest and understanding rather than competition. Ms. Marashio does not lecture but rather encourages discussion, asks questions, stimulates thinking, acts as midwife to original thoughts.

Obviously in only sixteen sessions it would be impossible to study all of the recipients in depth, but we have been encouraged to read where we want to and as much as we want to. We have also been asked to read actively, to respond individually and personally, and to make our own judgements as to the validity of what we have read.

Only once was there an "assignment" for all to read the same piece of literature, John Hersey's HIROSHIMA. (That was before I had joined the class; needless to say, I would have been the only one old enough to have read it in the issue of The New Yorker where it first appeared - and filled the magazine completely - in 1946.)

I've been impressed by my fellow students' loyalty to the course. They all attended the 1996 award to Tom Wicker, even though it was not held on a Tuesday night, and they provided some of the most probing questions afterwards. Moreover, each of them made the effort to attend this year's annual meeting of the New Hampshire Humanities Council, where Doris Kearns Goodwin, 1989 recipient, was the featured speaker and Donald Hall, 1983 recipient, was honored. Donald Hall joined their table for part of the evening, which was good since Hall seems to have been one of the recipients whom they have most enjoyed discovering, perhaps in part because his writing includes such variety... poetry, essays, memoirs, even children's literature.

I think I am right in saying that each of us has thoroughly enjoyed the course. I know I am right in saying that Raymond Holden would be gratified to know that the Sarah Josepha Hale Award, forty years after he conceived it, not only continues to exist but has grown to community course status.

Our reading and talking was to lead to our writing, about the course and about ourselves, and I was curious to know how this would come about. But come about it did, and the various pieces seemed finally to fit into a whole.

HOW THIS CAME ABOUT

"What stands out?" in the first medalist Robert Frost was a question each member of the class could respond to, an approach each tried. "How does the author convey what stands out?" moved us deeper. "What connects Frost and Hersey?" felt safe enought to answer. "What characters from each would converse? How? What does that help you see?" put us into a depth we didn't at first realize because we were so busy enjoying the answers we were sharing.

Reading Frost, then HIROSHIMA, reading widely then one author deeply, we learners with diverse backgrounds became so involved in learning that we appeared stunned at each step forward in seeing how our insights complemented the insights of classmates, by-passing the ever-present fears of not achieving.

Beginning in uncertainty, each of us moved tentatively into unanticipated depths. By October 5 I was able to write in my daybook:

> Though I sit at the head of the elegant table in the SJH room of the Richards Library, all eyes turn to me now - finally - for reassurance more than direction. Looking left, front, and around at the framed posters commemorating each Hale Award writer, I watch Brent's warm eyes light as he reaches toward his notes, leans forward, and begins "I could..." Reaching their support toward him, the other learners forget themselves in the moment; no shuffling of their papers or planning what they would say is taking place. They live in Brent's insight, and his modeling leads each in turn to become a comfortable center.
>
> Librarian Andrea Thorpe enters the room and sits in the chair to my left, the chair closest to the door. She shuffles her notes, settling in to the student words that continue to search for

understandings and connections. Her own transition, when it comes, compliments "you really know how to discuss a book" and jumps to "Sarah...."

Sarah's spirit watches this class as they reverently finger their ancient copies of HER life's work. She peers into their minds as they slowly scan, line by line, the words she had labored to place in her legacy. Is their reverence interfering with their appreciation? The nodding heads, the shy smiles, convince that - to the contrary - they feel more deeply in revering.

Awareness solidified in the in-class writing assignment when each reflected to determine what was speaking to him/her from the writers and what responded within each student to that call. Each learner responded spontaneously to the writers, to synthesize what expertise each of them took from and brought to the work. Listening that evening to the Hale tape of Donald Hall, I was struck by his line "vision makes light of contradiction." Learner responses did contradict, but their visions were taking shape and substance. And I laughed at Hall's "hum of a present continuing vanishing"; earlier this class had sought to freeze forever each present, struggled-for insight, but this evening Hall echoed their new willingness to let some vanish, to return or not as appropriate.

The live voice of Tom Wicker, this year's award writer, and later of other writers on tape and in person, mingled with our own. Like Wicker we accepted our writing "to explain things, to take complicated situations and make them clear." We moved within Wicker's subtext of picking out something interesting, discovering its sound core of fact, and bringing to that core our imaginations that expand. Wicker told us he looked for tough questions to be his best; for this class, the tough unknown - the not yet proven - the meanings that can and do emerge - led each and all of us toward previous myterious connections demanding to become visible.

As we began to study not just the writing but also the commentaries by the Sarah Josepha Hale writers about their writing, we found ourselves threading the writing, the insights of each writer about the writing, and our own writing about both.

Each learner embodied now the ability of close observation that they so valued in the Hale writers. We became part of the text - a whole new experience in literature learning. Having attended the medal ceremony for Tom Wicker and having heard his presentation, we understood the person/writer merge in him - and found it emerging through ourselves.

OUR THREADING

Frost had shown us so clearly that alluring nature of what draws us toward what seems NOT our work; he also revealed that those led to the road not taken have developed the expertise to follow the road less travelled. Each moment of choice really is not a choice but is a kind of inevitability of life, producing the MUST of how we choose. Frost taught us that to achieve what asks more from us we must respond to what asks the best from each of us.

Diana Wyman responded:

> *An author's work is an unfolding... Each work is distinct, a reflection of the person within. Each author writes of what he or she knows, what they perceive... How then can there be common threads among the Hale Award writers? They are truly a mixture of times and experiences, a mixture of values and beliefs, a mixture shaped by people and events of the day and the circumstances of their lives... What can I see that is common to all?*
>
> *What I can see emerging as a comon thread is their ability to create a truth of time and place and happening.... You will see as I do the essence of a character created by just a few lines. ...Imagine how anyone could make us understand the suffering and horror of the atomic bomb. In John Hersey's Hiroshina there is almost a calm as he very dispassionately describes events following the dropping of the bomb. An eerie calm that works our imagination and says that it is truly indescribable in terms of the words we already have for suffering.*
>
> *Not all characters and events of these writers bring us to dark thoughts or emotions. I especially appreciate and delight in Hall's description of tourists ... I will never feel the same standing in the lift lines at Sunapee knowing how ridiculous we all seem.*
>
> *Doris Kearns Goodwin brings history and characters to life in No Ordinary Time... The Roosevelts, of course, are the subject of the book, and they are presented in both a public and personal way... It is a portrayal that opened the door to seeing the true Elanor and Franklin. It is a personal view. I can remember the respect in my father's voice when he talked about Roosevelt and the programs that made our family's life possible during the depression.... You can feel this history in No Ordinary Time. I met the Roosevelts my father knew.*

These are my threads .... They move together into a pattern that speaks of the depth of skill of these authors to say something to me in a way I can appreciate and understand.

What Steven Bohrer appreciates and understands in the Hale Award writers is :

...Something deeper, something almost primordial. I feel maybe they can sense in each other the zeal and inspiration of "home" ... From Robert Frost's Silas, who had no real home but returned to the place most important to him to die, to John Hersey's account of the atomic bombing in Hiroshima and the Japanese victims returning to their ravaged homes, the theme is apparent. Doris Kearns Goodwin, who has been called one of the best historians in our society, has written biographical accounts of important 20th century figures, figures that have shaped her home and ours, America. Listening to her speak is as intense an experience as reading her works, and her passion for her home is always strongly expressed. Incidentally, Doris, as well as Donald Hall, another Hale Award winner, has a great passion for baseball, America's "home" game.... Elizabeth Yates went back to her home area to research her book Amos Fortune, Free Man. A feeling that she got from a gravestone in Jaffrey, N.H. never left her, and her book evolved from that feeling.

Home is where the heart is and where the soul grows. Though they go down different roads, the Hale Award writers all try to explain this to us, getting to the truth of home through both the upheaval that sometimes comes from it and the sanctuary that it holds for us.

When I asked Tom Wicker a somewhat personal question regarding similarities that I saw between him and a character in his Civil War epic Unto This Hour, he immediately responded with reasons why this shouldn't be. Then, when I quickly expounded further upon my observations, he furrowed his brow, scratched his chin and looked up to me. "I'll have to go home and think about that," he said.

Brent Bradley didn't have to go home to think. For him:

The Hale Award Writers course has become a part of me. I devour everything I can whether it's by or about the writers. In

the process, they begin to absorb me - I become a part of their work, and so I become the devoured as well as the reader, within the writing while outside it, and as I go deeper, these pieces connect me to a further understanding of myself.

I am aware of Raymond Holden predicting the existence of the Hale room, which became our classroom, at the Richards Library.

I am with Maxine Kumin as she speaks of her lamb's death in How It Goes On. I know that lamb; I'm in the dumptruck, and the barn, then suddenly somewhere between stanzas I am the whole wolf-world, in that leap as the lamb beomes the oppressed, the weak, and the silent among us.

My grandfather, Dick Bradley, illustrates his grandfather, in a paragrah in "Family Farm." Grampa Bradley was never connected to the Hale award. He never attended the ceremony; he probably never thought a whole lot about it. He was busy being a farmer, nightwatchman at the mill, road worker, State Legislator, County Commissioner, and a devout father figure. But, he always wanted to write.

I remember his anguish, during the beginning stages of Parkinson's disease, as he related to me the frustration he felt trying to translate the stories of his life to words on a page. He considered me a potential writer, and so told me how he wished he'd practiced the art more, so he'd be able to put his memories to paper now.

I was gratified to read The Old Life, by Donald Hall, and find my grandfather still alive in the characters of the book. He is, by turns, the old yankee, the farmer, the Red Sox fan, the factory worker, even (in his grandson's mind) Donald Hall himself. I'm sure that's just the way grandpa wished that he could write.

Ultimately, these characters that my grandfather and Donald Hall put to paper connect with us at a basic, gut level almost instantly. They shoot for the heart and mind with a dart so void of pretense, that we scarcely notice when we become theirs.

As I try to see my world more clearly, to understand and participate in it, I begin to realize how important the ability to really connect to people is. That moment we truly understand

each other - that instant in which we see what we honestly are - those are the moments in life worth searching for. Each of the Hale Award writers speaks to us in this way. They each, in different approaches, make their characters alive for us, their struggles become our own, and our own become clearer.

A writer's job is to involve the reader. Truly good writers intimately include the reader in their piece, so that as the piece moves along, the reader moves with it. Writing that changes the reader.

For all the ways we exist, yet remain removed from each other and ourselves, these artists' voices thrive, hoping to mingle with our own spirits somewhere between waking and dreaming; and we may intensify our connection with each other and our world.

Lynn Patriquin contributed her weaving of our mingling and connecting, including:

We came together not so long ago, six strangers, each here for our own reasons, each expecting to be led through this journey by our leader with a map and a plan. Our leader, our common denominator, informed us that first evening that there was an idea, a beginning, and a goal of sorts but there were no direct or plotted roads from here to there and no real promise of one. We were in uncharted lands, looking for something that might not be there, and we had only a short time, in the scheme of things, to discover whatever it was we were looking for. Another joined us, as so often happens in an adventure tale, and we were richer and closer to the award than we had ever expected to be, for now we had with us one who had traveled the road from the beginning.

The weeks passed and the threads multiplied and we each became more and more aware of the patterns that we were forming. At times, an author's work wouldn't fit into my pattern and threads were left hanging, but through reflection and discussion those threads would be woven somewhere else.

We became aware that the same words very often had different meanings to each of us without changing the essence of the story or poem. We read into the author's words our own experiences, emotions, and personalities. The authors allowed us that but always kept us on the road they were paving, and we realized what skill these people have in their art.

We began to listen to the authors, and it brought a new dimension to the project. Donald Hall was the first we heard on tape. Now, we were hearing the words we had read, presented in the voice of the author, as he heard it in his mind and heart and soul. I realized my own regrets at not having saved the stories that were told to me all those years ago. Unlike Hall, I had lost those strings and fragile threads to my past. We listened to his readings from the Hale awards and he became real to me. He's a man who has a sense of humor, and a wonderful voice, and he even made mistake or two. I couldn't help but smile as he read The Ox Cart Man, a poem he transformed into an award winning children's book. There was no way that I could know that evening, that in the not too distant future, Donald Hall would be sitting at our banquet table, the ruins of a turkey dinner, apple pie and coffee between us and that I would ask him about The OxCart Man. There was no way I could know of his excitement and his awe of the poem. And I knew as he talked about The Ox Cart Man that it had been a gift to him. He spoke of the years that he worked on the original poem, and of the decision to write the children's book. He spoke like a child who had made an incredible discovery, words spilling out, eyes dancing, body poised as if he would jump out of his seat. Then he paused as if making a decision, and he turned and said, "It was a gift... It really was," almost as if we wouldn't believe him. But, I had known. I'm a believer in gifts.

And after he left the table those words haunted me. They drifted into my thoughts as Kearns Goodwin spoke of LBJ and the Roosevelts. They followed me home riding high on the bright October moon. They became entangled in\my thoughts, whispering to me like a secret, and the search became personal. The purpose of my journey shifted, the direction was less sure, the vision less clear. I found I had to take a long, deep breath and look back across the roads I had traveled.

In that journey back, I returned to the night we were asked to try to imagine some of the characters of different authors meeting each other. At first it seemed like an odd request, but knowing our leader and trusting her I followed her down that path.

I thought about Doris Kearns Goodwin, who was the guest of honor at that same banquet, talking about her imaginings, those things she couldn't put in her books because there were no facts to back them up, talking about what might have happened if Roosevelt's guests bumped into each other in the hallways of the White House late at night in their robes and slippers. Her playing the imagining game too, somehow gave more credence to what we had been doing.

I had been so deeply involved in the project, searching for threads and roads and common grounds, that I had quite forgotten the person for whom the award was named. What would she say about these authors and their work? Would she approve of the choices that have been made in her name? I went back to the library one cold Saturday morning in November and requested to look through her books in the case in the room named for Sarah.I followed the page up the stairway and breathed in that smell that only older libraries seem to have and remembered times from my past and thought of Donald Hall and his past and smiled at the thought of his excitement when speaking of The Ox Cart Man. As I waited for the young page to unlock the glass cabinet, I looked around the now familiar room. I ran my hand over the dark wood of the massive table, and read the names of the authors I had known so little about just a few months before. Now, I know their work, know their voices; the search had become so personal. The thick leather volumes of the "Lady's Book" and yellowed copies of "Godey's Magazine" awaited, and as I chose the 1856 volume of the "Lady's Book," I felt as if I had found the golden thread, the one that would somehow tie this part of the search together. I opened the book and my senses were filled with time that had passed, the crackle as I turned the fragile, yellowed pages, the musty smell; all reminded me of years gone by, and from somewhere deep inside of me, Kumin softly whispered "Our ground time here will be brief." And as I wandered through the pages, drifting back in time I became aware of all that was contained in this volume. There was history and poetry, prose and biography. There were stories about human nature and adventure, and I realized more than I ever had

before that the thread that tied the award winners together was the thread that tied them to Sarah. It was the diversity of the writing, the depth and expanse of it. I couldn't help but imagine Sarah smiling and nodding as each new author was added, never excluding one because they wrote in a different style or technique but accepting each for their individuality. I imagined her giving young writers, unknown writers, hopeful writers a chance to strut their stuff on the same stage as the guest of honor. The imagining happened swiftly, like imaginings often do, but I feel there was some truth in it.

Our numerous threads are equally valued. Begun in uncertainty our course ends in a threading of learning writers with award writers, of community library and community college, of past discovered, present constructed, and of future classes which will study not only award writers but also the student writers who designed this first threading of Sarah Josepha Hale Award Writers. My hope unfurled for this class is the value, unsurpassed, of learning the pathways of all that is local. Discovering connections between what has become familiar and the yet unexplored, our first New Hampshire Community Technical College class on the Sarah Josepha Hale Award Wrtiers lights not only insights uncovered but also the lure of new mysteries yet to be explored.

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TO DREAM THE IMPOSSIBLE DREAM

Janice G. Kaliski

Background

Last May I showed up at Texas A & M University not knowing quite what to expect from my participation in the Faculty Enhancement Program that I would be attending. Did I dare to hope for the impossible? Would I be given some concrete suggestions that might actually work in my classroom back at the Nashua campus of the New Hampshire Community Technical College? Would I be the only person there who felt this discouraged about teaching physics at the two year college level? Yes, I felt dejected when I arrived in Texas.

Let me explain how I came to feel this way. I had just finished my tenth year at NHCTC. However, this time I could barely wait until the semester was over as it seemed as if the students had sunk to an all time low in terms of ability, interest, and motivation. In the years that I had been teaching at the college, I had not taught the course in the same way more than two terms in a row. Labs had been revised, revamped, added, or dropped; "hands on" activities had been added or omitted; lessons had been based on strictly a conceptual approach with a minimum of algebra, or based on an algebraic approach; and calculators and computers had been introduced as tools for success. But, this time, it had not seemed to matter what approach I took in the classroom. Something was definitely wrong as the majority of the students were not responding in the manner that I had come to expect.

My frustrations did not go unnoticed. I suspected that the real cause of the students' poor performance had more to do with their weak math background and undeveloped critical thinking skills than with the subject of physics. To test this premise, Ken Paradis, Dean of Academic Affairs, urged me to submit an application for consideration as a participant in a National Science Foundation supported model two year enhancement program for Two Year College physics faculty members (PEPTYC). The program consists of two May Institutes that are two weeks long and are held at Texas A& M University, and four academic year Follow-up Workshops. I was overjoyed when I received word that I had been accepted as a participant in this program. The solution to my problem was about to be revealed.

The Experience - A Revitalization

Words can't begin to adequately express what happened to me as a result of those two weeks in Texas. First of all, I learned almost immediately that my view of physics education was shared by the other 23 participants. Although we had come from all over the United States, we all had experienced the same general feeling that our attempts to teach physics to today's breed of students were not as successful as they had been in the past.

Times had changed, the students were not the same, the classroom was not the same, and yes, our methodology needed to reflect these changes as well. Yesterday's lessons no longer worked.

The workshop provided us with a veritable wealth of ideas about how we could bring about a reformation process in our own classroom once we returned home. The exposure to new ideas on how to teach physics or to new teaching strategies to use to implement reform coupled with Cracker-Barrel Sessions (the role of these sessions was to stimulate thought and conversation) and Microcomputer-Based Laboratory experiences permitted us to begin to dream the impossible dream once again. Our faith in our own abilities was rekindled by our exposure to seminars in Elementary Particle Physics and in Quantum Physics. We discovered that the intelligence that enabled us to initially earn our degrees was still there, even if it was somewhat dusty from lack of use.

We all gained from the stroking that we received while in Texas. Had we forgotten how wonderful it made us feel when a professor had acknowledged our efforts and contribution to some project or the result of some research we had done? Some of my most vivid memories of the two weeks in Texas are of the times we shared our ideas with each other and had fun while doing so. The positive stroking we received from the leaders of the workshop or from each other influenced our goal to become better physics educators. It also empowered us with the enthusiasm and the confidence to share what we had gained with our colleagues back home.

Back To Reality

Shortly before I learned that I had been accepted into PEPTYC, I was promised that this was the year that the physics lab would be updated. Just knowing that I would have eight lab stations at my disposal was a promising prospect that kept floating in and out of my thoughts on the return flight home. I would be able to introduce some of those MBL (microcomputer based labs) activities that I had just learned about in Texas. This

seemed to me the best place to initiate any change in the curriculum. But, when I got home I learned that the scheduled update of the lab was not to be, much to my disappointment.

It was not a total loss, though, as $3,000 for lab equipment had been allotted for use in the lab. I considered it wise to do whatever was necessary to not only upgrade the equipment in the lab but to also make sure that the amount of equipment was sufficient given the number of students enrolled in physics. I compiled a budget for this amount and submitted it. Yes, I felt like a little kid at Christmas time. Visions of some quality time in the physics lab danced around in my head. This small grant would somehow make up for the fact that my lab was not going to be computerized after all.

Change in the Classroom

So, even though I was starting the Fall term with essentially the same lab equipment and fewer supplies, I had the prospects of all the new equipment to spur me onward. I decided to concentrate on developing a new approach to teaching physics based on a combination of the examples we had explored at the Institute. My logic here was to introduce a couple of changes during the Fall term, and then revise the approach before introducing it for a second time in the Spring term.

This new approach was very structured and repetitive in nature on purpose. Students need this type of approach to foster a deeper understanding of the concepts and to help to program their brains to recognize the concepts when they appeared in some other form later on in the course or in their lives. In other words, I discovered while in Texas that you begin reaching out to your students by starting at about the same level of understanding that they appear to bring with them to the course. I also planned to nurture them with plenty of positive stroking as I had been in Texas.

I started by introducing the concept of the ratio for a specific reason: I had read a book written by Arnold B. Arons, former president of the American Association of Physics Teachers (AAPT) and professor of physics at the University of Washington. Arons closely examined the systematic research that was done in the previous twenty years and combined his findings of this research together with his own personal experience as a classroom teacher to develop a methodology text called "A Guide To Introductory Physics Teaching". [1] This text can easily be considered as

[1] Arnold B. Arons, "A Guide To Introductory Physics Teaching," John Wiley & Sons, Inc. (1990)

a "how to manual" for teachers at any point in time in their careers. His guide begins with a discussion of the fundamental gap in the background of most students. "These gaps, having to do with understanding the concepts of "area" and "volume" and with reasoning involving ratios and division, are often encountered, even among students at the engineering-physics level."[2]

I decided to do a little research to confirm what Arons had stated in his book and to also confirm my own suspicions. I provided the students with a variety of containers and told them to measure the circumference and the diameter of several of these containers. It took some doing, but they finally understood the relationship between the diameter and the circumference.

They also seemed to understand the usefulness of the ratio as it applied in this case. Or, so I thought. But, would they be able to use the ratio as a tool later on when physical quantities were being compared?

While I was in Texas I was able to preview some 16 sample innovative programs that were instructional models based on the results of physics education research.[3] It was interesting to note that while all of these models represented the major reform strategies for Introductory Physics they also represented diversified approaches for use in the classroom. Each model did contain some common elements:[4]

1. Active Learning
2. Strong emphasis on interaction with phenomena
3. Clear and explicit linkage of representation to phenomena
4. Elicit student conceptions
5. Have students evaluate alternative hypotheses
6. Goals of tasks are conceptual and conceptual means are required to accomplish them.
7. Tasks are reduced to a size that is more manageable for novice students to handle.
8. Less is more.

I next introduced a modified version of Overview, Case-Study Physics, (OCS) an approach to teaching physics conceived by Alan Van Heuvelen.[5] I deliberately chose the OCS approach out of all of the samples I had previewed. I did so because I felt comfortable with this approach

[2] ibid., page 1
[3] Robert Beck Clark and Thomas L. O'Kuma, May Institute 1996 PEPTYC IV
[4] ibid.
[5] Alan Van Heuvelen, "Overview, Case Study Physics," American Journal of Physics 59, 898-907 (1991)

and could readily "buy into it" as it seemed so natural. One of the PEPTYC Directors, Thomas L. O'Kuma, who is also president-elect of AAPT, shared how he modified this approach by providing samples of material from an OCS study guide to accompany a traditional calculus-based introductory physics course and samples of active learning problem sheets from the ALPS KIT that could also be used in algebra-based courses. The goal[6] of OCS is to integrate the results of research done during the past two decades into both the study guide and the ALPS KIT for the express purpose of helping the student to:

1. Acquire a better qualitative understanding of physics.
2. Learn to use expert-like methods to solve problems.
3. Organize physics knowledge in a hierarchical structure that links common ideas and provides better access when needed.
4. Develop general analytical skills for use in all aspects of life.

My version of the OCS approach started by representing motion with motion diagrams as conceived by Van Heuvelen[7]. The diagrams represent the position, velocity, and acceleration of an object at several different times. Once the students understood the diagrams I had them apply the concept of the ratio to the changes in the motion of an object. Students applied the concept by finding the slope of graphs representing three separate cases of data of time and distance that had been recorded during a lab investigation. By the time the students finished this lab investigation, I realized the extent of their weak math skills as well as their low reading levels. Things were definitely far worse than I had ever imagined since these students had apparently passed both semesters of college algebra and trig prior to taking physics. I was stunned and felt stymied since I was not sure what to do next.

Although I pushed the students hard, I continued to introduce material in a structured format, to use motion diagrams and free-body diagrams, and to review algebra when necessary. To increase their level of reading comprehension, I concentrated on the words in a problem and what they meant. I urged the students to learn the "mystery" physics code so they could unlock the secrets found in a problem. Common elements, words, and phrases were identified and labeled as the code was revealed. Singular student successes were awarded huge smiling faces on their paper or on the black board.

[6]Alan Van Heuvelen, "Overview Case Study Physics STUDY GUIDE I," The Ohio State University, 1-iv, 1990.
[7]Alan Van Heuvelen, "Overview, Case Study Physics," American Journal of Physics 59, 899 (1991).

I admit, this was the first time that I had pushed the dual role of coach/cheerleader to its limit. I was not sure how students would react or if they would truly appreciate what was happening. I also did not know if I had the physical strength to do this over and over through-out the term. Wasn't it reasonable to assume that at some point the student's own interest and motivation would take over and my job would be greatly reduced? I never reached that point for the majority of the students during the Fall term. Instead, many wanted me to continue to hold their hand as I led them along the path to success. I tried to wean them off me, but the students held on firmly. It goes without saying that I did not necessarily complete what was expected of me during the Fall term. But, I felt that what had been taught had more of an impact than had I rushed through all of the expected topics to be covered.

I recorded notes about each lesson and jotted down suggestions for the revision of the approach at the end of each class. I used this information to develop my lessons for the Spring term. I began that term by not using the activity focused on understanding what a ratio was as I felt this activity emphasized math weaknesses. Instead, I introduced the concept of the ratio by having students measure a wood block in both the metric and the English systems. The systems of measurements were then compared. This was a far more useful expenditure of everyone's time. The students did not feel threatened, nor did they feel intimidated. Since they were encouraged to share their findings with each other, the students were soon helping each other understand the differences between the two systems of measurements, how measurements were recorded, and how significant digits were treated. Students' understanding of the concept of the ratio was tested during the next lab investigation when the students were given a metallic unknown and told to determine its identity.

This time as I was introducing motion via motion diagrams, a student suggested that I quantify the diagrams as it would help him to better process the information contained in the diagram. What a marvelous idea! I quickly quantified the diagrams by giving appropriate sets of data for each type of linear motion Students were to construct separate motion diagrams on individual sheets of graph paper based on the given data for the two cases. Students started this by representing the initial position of the object that was moving by filling in with pen or colored pencil four small squares on the graph paper.

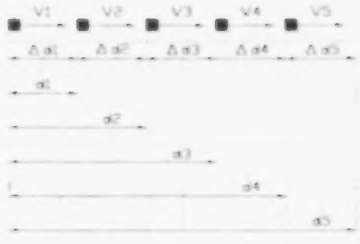
The position of the object at the next time interval was determined by using a scale: if the object moved 2 meters during each time interval, how many squares could show this repeated motion? Thus, if four squares represented the change in position one, eight squares would then represent the next position, and so on until all five positions were indicated. Students were then asked to make linear graphs of the data once these motion diagrams were completed. After all the students had finished, they shared their findings with each other and then with me.

There definitely were some excited voices as many finally understood the meaning of the phrase "position as a function of time" and realized what a direct relationship truly meant. More than that, they readily understood the comparison of distance to time at each position, realized that this was an application of a ratio, and could correctly label this comparison as the slope of the graph. They eagerly went on to the next set of data. A graphical summary of the findings for uniform motion that is shown in Figure 1, and for uniformly accelerated motion that is shown in Figure 2. was compiled by CADD/CAM senior Robert P. Eldridge for my use in the classroom.

UNIFORM MOTION

t (s)	d (m)	v (m/s)	Δv (m/s)
1	2	2	0
2	4	2	0
3	6	2	0
4	8	2	0
5	10	2	0

THE CONSTRUCTION OF UNIFORM MOTION DIAGRAM



Assumption: Object is already in motion when the timing begins.

Figure 1

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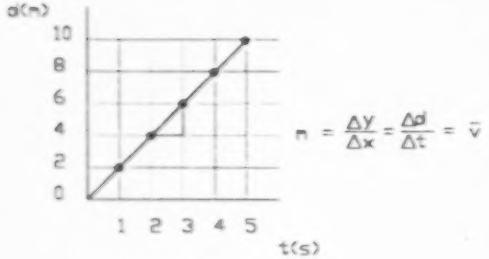
SUMMARY OF UNIFORM MOTION DIAGRAM

1. Displacements are equal.
2. Velocity vectors are equal.
3. Change in speed $\Delta \bar{v} = 0$; $a = 0$.
4. Distance varies directly with time; as time increases, d increases.
5. Slope shows the change in position as a function of time: $\Delta d/\Delta t$ slope, $m = \bar{v}$ = constant.
6. Equation for line: $y = mx+b$ becomes $d = \bar{v}t$

Distance as a function of Time in Uniform Motion



Velocity as a function of Time

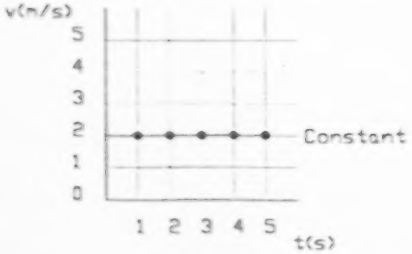


Figure 1

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UNIFORMLY ACCELERATED MOTION

t (s)	d (m)	v (m/s)	Δv (m/s)	a (m/s²)
1	1	1	1	1
2	4	2	1	1
3	9	3	1	1
4	16	4	1	1
5	25	5	1	1

THE CONSTRUCTION OF UNIFORMLY ACCELERATED MOTION DIAGRAM
(Blocks specify Position)

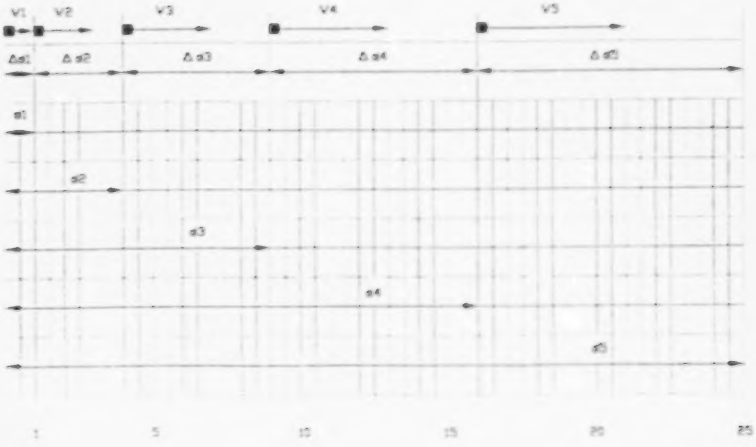

Figure 2

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SUMMARY OF UNIFORMLY ACCELERATED MOTION DIAGRAM

1. Displacements are not equal increase with passing time.
2. Displacements increase faster than the time increases.
3. Change in speed is the same at each position.
4. The rate of change of the speed or the acceleration is constant.
5. Velocity vectors increase in length with passing time; $(\Delta v) = a\ (\Delta t)$.
6. Displacements vary directly with time squared. slope is $\Delta d/t^2$.
7. Velocity varies directly with time.

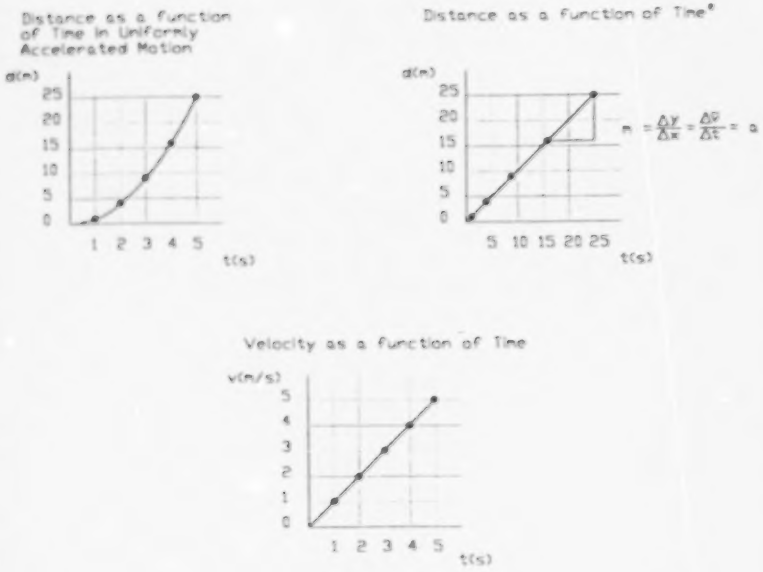

Figure 2

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I was stunned over how quickly the students gobbled up this concept and could apply it to a variety of different applications. Even those students with weak algebra skills that prevented them from showing why this was true could tell me orally what had happened. Consequently, because students understood the differences between uniform motion and uniformly accelerated motion, introducing the concept of forces by exploring Newton's Laws of Motion turned out to be sheer joy for me. In turn, the students appeared to have an easier time learning the code used to solve problems. The ease with which they would jot down the code made me realize that my students were no longer intimidated by word problems. Instead they were attacking them, processing the data, and then solving them.

A funny thing started to happen almost over night: students started to relate what they were learning to everyday experiences. Once that kind of thinking starts, anything is possible. There are three possible explanations for the students' success this term. First off, I had the experience of one semester with this new approach under my belt; secondly, I had quantified the motion diagrams which promoted a greater degree of understanding among the students, and lastly, I had the students use spiral-bound index cards to keep track of noteworthy concepts explored during each lesson. This last idea may sound pretty elementary, and it is, but these students use these cards to review for quizzes or to complete assignments. It is not uncommon to walk into the cafeteria and observe some study groups deeply absorbed in a problem with the several sets of index cards opened to various entries. These cards have indirectly encouraged communication.

The Dream Was Possible

When reflecting on this semester, I will try to not think about the lab equipment specifically ordered to help students understand motion and forces that had been ordered in early October and was delivered in April. What I will remember is that this was the year that I reached my students on a more meaningful level than ever before. I will also remember that not only was this the year that I began to dream the impossible dream again; it was the year when I knew in my heart that this dream was not a pipe dream. I knew this because the biggest change that had taken place had been right within me.▼

BEYOND THE BOOK

Denise S. and Tyler S. St. Cyr

Rooted in several theoretical areas are activities that wed psychological constructs to real life. This "marriage" empowers students to make a crucial connection between textbook and life, thus providing meaning to the content of psychology.

Jersild (1975) advances that teachers must move toward something that is personally significant beyond the facade of facts, subject matter, logic, and reason behind which human motives and a person's real struggles and strivings are often concealed. He further contends that "this does not mean the rejection of subject matter – far from it – but it does mean helping the learner to relate himself to what he is learning and to fit what he learns into the fabric of his life in a meaningful way." The writers of this article contend that this is an essential function of quality education.

Compiled in easily usable form on the subsequent pages are activities (not in any specific order) relevant to communication, critical thinking and motivation. Exercises germane to values and relationships are alluded to and related to psychology.

Though communication is found on the third level of Maslow's hierarchy of needs, it is central to the entire field of psychology, to people's lives and to their daily interactions with others. The following Communication Inventory has been designed to assist people in assuming a proactive position in their dealings with others.

COMMUNICATION INVENTORY

1. Describe a situation in which you communicated something to someone significant in your life.

2. On a scale of 1-10, how difficult was your communication? (1=low; 10=high)

3. Why?

4. On a scale of 1-10, how valuable to you was your communication?

5. Why?

6. Why did you choose that person?

7. Did you garner the results you wanted (feedback)?

THE TUKATOOME TILE

Pivotal to the core of **any** subject is critical thinking. Though the writers are not mathematically inclined, they have selected a mathematical teaser entitled "The Tukatoome Tile" to inspire critical thinking.

THE TUKATOOME TILE

To my niece:

My tile has polygons, more
than meet the eye.
They fit together like a piece
of pie.
Some are hidden and hard to
see,
So, be sure to count them
carefully.

The tile is worth $60 million
they say,
And its value was found in
the following way.
Three million for a triangle;
for a quadrilateral, four,
Five million for a pentagon;
for a hexagon, one more.

Good luck,

Aunt Tuka

The Tukatoome Tile exercise is excerpted from MATHLETICS: Gold Medal Problems, Janson Publications, Inc., 1990, and reprinted by permission of Everyday Learning Corporation, Chicago, Illinois.

HOW TO KEEP MOTIVATED

CAN'T SUCCEED WITHOUT MOTIVATION. Motivation is the link that keeps people moving forward. The following activity is provided with permission by New Hampshire College (1997). Studying for your college degree is one of the most demanding commitments that you will undertake in your adult life. Most students enrolled in the Continuing Education program at NHC take two courses every eight weeks while

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fulfilling all of life's other roles such as husband, wife, parent, friend, employee and most of all, person. However, after a few courses, the original motivation, the driving force that brought you to NHC's Continuing Education division may begin to lessen, leaving you to question your desire to complete the degree you set out to attain. Let us give you a fresh perspective and some personal insight as to what motivates you.

MOTIVATION PROCESS. First, let's look at the motivation process. Motivation begins with a goal and an unfulfilled need. Some needs occur because of outside forces such as a requirement for promotion. For others, inner forces like a deep-seated personal need to learn, compete, or challenge oneself are extremely motivating. What are your goals? What are your unfulfilled needs?

CHANGING NEEDS. As you continue to complete courses in the degree program it's easy to lose sight of what motivated you to get your degree in the first place. Your needs change all of the time; therefore, it's important to look inside and discover why you're not motivated to take that next class or finish the class you're currently taking.

FOCUS. Of course, there are many different need-satisfiers available to you. These also cause you to lose sight of your original goals. Sometimes it's easier to settle for less when the pressure becomes too intense. For instance, another job might not require you to get more education. Or you might want to stay at your present job. To better understand what motivates you, we suggest you take a closer look at what you value...why you get out of bed in the morning...who or what do you hold in utmost importance in your life. Are you happy?

GOAL SETTING. A key in the process of staying motivated is setting both short- and long-term goals. First, you need to set goals that give you something to strive for, something that's going to make you happy! Once your long-term goal is set, it's of equal importance to break down that goal into many short-term attainable goals with target dates.

GATHERING SUPPORT. Another very important factor in reaching your goals is the development of a reliable support system. The process of completing a college degree program is demanding and stressful. Support from family, friends, and coworkers goes a long way toward helping you in your program.

OWNING YOUR DECISION. The last, most important factor is that you own your decision to go after the degree. When times get tough and you begin to doubt yourself it becomes easy to drop out and attribute your

poor experience to someone else. If your employer requires a degree for promotion and you decide to go for the degree, then you made the decision to return to college. No one else! It might have been the employer's requirement that encouraged you to get a degree, but your driving motivation, probably your need to be more challenged and therefore more successful in life, played a major part in your decision. You must own your decision.

VALUES. Values, those things that are of most importance in our lives, are directly correlated to what motivates us as individuals. Can you identify what your top values are? Most people can give some generalizations when asked what it is that they value. To help you identify your top values we've incorporated a values identification exercise on the following page.

VALUES EXERCISE. Begin this exercise by first reading through the values list located on the following page. Then go through the list a second time and rate each of the statements using the following rating scale.

1 An absolute must in your life
2 Very important
3 Important
4 Not very important
5 Not important at all

Once you've completed this step, go back through the list and narrow down your top 10 choices. It's advisable to begin with the 1's and proceed to the 2's if necessary. What you are left with are your top values in life, those values that are of most importance to you. Record your final list of values in the space provided below.

REFLECTION. As you review your top values ask yourself: how do my educational plans fit my life values? Now you have a better understanding how they fit and what role each college course plays in reaching your ultimate goal of receiving your degree. Ultimately, your college degree must relate to your life values.

MY TOP LIFE VALUES

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

7. _____
8. _____
9. _____
10. _____

Can you see the relationship between your top values and your continuing education?

____ owning a fine home
____ wearing fashionable clothes
____ having freeing relationships
____ having harmonious relationships
____ having confrontational relationships
____ having good food and drink
____ having cars (or boats or planes)
____ earning and having money
____ traveling and seeing the world
____ having challenges
____ having financial security
____ living the "rich life"
____ having a close family
____ having steady employment
____ using my creativity
____ having a good marriage
____ having close friends
____ being productive
____ feeling my life counts
____ helping others
____ being a hard worker
____ using my skills and abilities
____ continuing self-discovery
____ being close to nature
____ feeling my work really counts
____ empowering others
____ using my mind
____ working for important causes
____ being safe
____ having a good fight

____ taking risks
____ accepting physical or athletic risks (challenges)
____ having cultural opportunities
____ stretching myself emotionally
____ being my own person
____ being in a position of authority
____ stretching myself mentally
____ expressing kindness and love
____ having possessions of value
____ fostering respect for all
____ using my body
____ learning and gaining knowledge
____ being spiritual
____ being an authority in my field
____ getting and using power
____ having fame and recognition
____ participating in religious or club activities
____ having a personal relationship with God
____ being politically active
____ being free and independent
____ having honesty and integrity
____ having a meaningful love relationship
____ being in front of the crowd
____ working independently
____ playing and being playful
____ having good health
____ living a long life
____ working with a team or group
____ resting and relaxing
____ having career satisfaction
____ having adventure and excitement
____ supporting justice for all
____ having and making order
____ having new and unique experiences

SKILLS INVENTORY

Because students live in a McDonald's-Burger King World, the theme of stress is uniquely important in their studies of psychology. Weiss, Katzman and Walchick provide a crisp inventory that allows students to analytically introspect specific skills which they may possess or lack.

Entitled "Which of These Skills Could You Use More Of?" (1986), it assists students in identifying their own stress. Further, it calls attention to their communication, organization, perception and enhancement skills. Students then make choices about whether or not to act upon this information and change particular aspects of their lives. Should they not change anything, they realize that they must accept the consequences of this decision.

RELATIONSHIPS

Relationships are explored through values and choices in the form of selected questions proposed by Gregory Stock in The Book of Questions (1987). Students explore such issues as happiness, fulfillment, death, abilities, qualities, communication, accomplishments, love, security, power, excitement, knowledge, money, relationships, standards, IQ, self-esteem and gratitude.

CONCLUSION

Teachers share these activities and others with their students who in turn share their thoughts with their teachers and peers. All grow and change to some degree thus, according to Dr. Alfred W. St. Cyr "Education is a process of growth through change." We concur.▼

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BUILDING THE GLOBAL INITIATIVE: LEADERSHIP TOWARD A BARRIERLESS WORLD OF ONE COMMUNITY*

Marjorie Goodson

This essay is an essay from the soul, about the soul. It is an essay about building a global initiative. It is an essay about the leadership needed to build a barrierless world of one community. It is an essay about the soul modeling the way. "The signs point toward spirit and soul as the essence of leadership. There is growing consensus that we need a new paradigm to move beyond the traps of conventional thinking" (Bolman & Deal, 1995, p. 39). What we build is not necessarily a new paradigm, but it is a different paradigm. It is looking toward our spiritual guide in our own belief. Bolman and Deal reflect on spiritual guides:

> In his First Epistle, John the Evangelist wrote of Jesus, 'The spirit you have received from him remains within you, and you don't need to have any man teach you. But the spirit teaches you all things and is truth.' The same message is found in many other spiritual traditions. (pp. 39-40)

Hammerschlag (1993) describes the qualities of the spirit in the following manner:

> It does not matter how long your spirit lies dormant and unused. One day you hear a song, look at an object, or see a vision, and you feel its presence. It can't be bought, traded, or annihilated, because its power comes from its story. No one can steal your spirit. You have to give it away. You can also take it back. (pp. 170-171)

When we are connected to our soul or spirit we have the ability to let go and empower others. There is no longer a need to be in control. Letting go is the key to paradigm shifting. Letting go is not a new paradigm either as reflected in the following poem of the visionary, William Blake (cited in Bolman & Deal, 1995):

**A Programs for Higher Education Scholars Program essay presented at the 1996 PHE Nova Southeastern University Summer Institute, Tucson, AZ., May, 1996.*

He who binds himself to a joy
Does the winged life destroy;
But he who kisses the joy as it flies
Lives in eternity's sunrise. (p. 58)

Letting go is becoming fearless. "I want to find courage – like the Cowardly Lion in the Wizard of Oz. The Wizard says that everyone is afraid. Courage is the ability to go on anyway" (p. 47). Cate, a manager and new mother, found the courage to go on anyway when faced with the fears of leaving her four-month-old baby daughter, Riley, and returning to her high-powered global job. It was at this point when she realized that she wasn't sure that she wanted to wear those "hotshot shoes" anymore (C. Boeth, personal communication, April 5, 1996). That very realization of the need to let go and focus on soul has been a paradigm shift that lifted her into the true mode of being part of a different global initiative. When she was a speaker in many different countries, she was in control. When she looked at her newborn, her life changed and so did her soul. There will be a change in the mode of operations for Cate as she becomes part of the true global initiative. She will work from home more often, empower others, and utilize the technologies for conducting global business. Her husband has taken a sabbatical to care for their baby for the next six months. He will edit books from home while attending the needs of the rest of his family. Riley's birth triggered excitement, surprises, unpredictability, fearlessness, and soul.

Wheatley (1995) addresses this same need to let go and delight in "whatever."

> I would be excited to encounter people delighted by surprises instead of the ones I now meet who are scared to death of them. . . . We would seek out surprises, relishing the unpredictable when it finally decided to reveal itself to us. (pp. 142-143)

Senge (1990) concurs with Wheatley's appraisal of some people when he says, "When asked what they want, many adults will say what they want to get rid of" (p. 147).

Cate does not discuss what to get rid of, but she delights in the surprises and the joys of her family as she faces the return to work next week.

> These two and ½ weeks with Rick have been so precious. I still can hardly believe I've got such a wonderful life, with such good people around me, and the most breathtakingly charm-

> ing and bright baby. Rick's such a great parent too-it's so much more fun with both of us tag-teaming it. (C. Boeth, personal communication, April 24, 1996)

Leadership is a relationship, and according to Wheatley (1994), "relationships are the basis of all definitions" (p. 34).

De Pree (1992) shares his relationship with the premature birth of his granddaughter, Zoe. The nurse told him his responsibilities in this relationship.

> Ruth gave me my instructions. 'For the next several months, at least, you're the surrogate father. I want you to come to the hospital every day to visit Zoe, and when you come, I would like you to rub her body and her legs and arms with the tip of your finger. While you're caressing her, you should tell her over and over how much you love her, because she has to be able to connect your voice and your touch.' . . .Without realizing it, she was giving me one of the best possible descriptions of the work of a leader. At the core of becoming a leader is the need always to connect one's voice and one's touch. (pp. 2-3)

It was with the birth of Zoe that De Pree's soul truly engaged. Even though he had managed a company for years, he had never touched the core of leadership until that moment. It was with the birth of Riley that Cate's soul truly engaged. Even though she had managed groups in industry for years, she had never touched the core of true leadership until that moment. These two stories contain the essence of what is needed to build a barrierless global community.

"Leaders must be change agents and innovators. . . . We maintain that the majority of leadership in this world is neither entrepreneurial nor intrapreneurial" according to Kouzes and Posner, (1990, p.38). Leaders are unordinary, ordinary people with soul.

Leadership toward a global initiative is souls modeling the way. This is not a new paradigm, but it is breaking the convention that has become business as usual. It is the business of the unusual and the business of souls modeling the way. It is walking this earth softly so as to sense the quiet beating of another's heart.▼

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A PEDAGOGY BLUEPRINT FOR THE 21st CENTURY:

Pedagogy and Assessment Implications of "Using Voluntary National Skill Standards in Performance Based Curriculum Design"

by PEDAGOGY Committee

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A Pedagogy Blueprint For The 21st Century

Once each student crosses the threshold into The Virtual Workplace they are immediately transformed into an employee of a virtual business. The first day on the job, skill standards and general expectations are clearly articulated by the instructor-employer. The student-employee quickly learns this unique educational environment is a "hands-on" learning experience where information is not obtained from a lecturing instructor nor from cookbook lab experiments. Instead, students, organized into teams, are working with team members collecting, interpreting, analyzing and evaluating data for the purpose of problem solving. Individual student-

employees are held accountable for performing each task competently and for eventual mastery of skill standards. Meanwhile the instructor oversees the operation of The Virtual Workplace through the preparation of lessons and lab assignments, using the skill standards for their occupational area as the focal point.

From this vantage place one can see the 21st century classroom. Yet, one can also see back to the future. For all its outward sophisticated employment of high tech equipment, The Virtual Workplace is a throwback to the Middle Ages' world of apprenticeships. The major difference between these two worlds is the specifically prescribed written performance skill standards from which the program, the course content, methodology, and student assessment flow.

Like the apprentice in the Middle Ages, students learning in The Virtual Workplace experience an on-the-job training program that fully prepares them to easily move into a job in the real workplace. Upon entering The Virtual Workplace the student becomes a professional who works and behaves as a professional. Each student-employee is evaluated using the same skill standards as industry. The student-employee must demonstrate a required level of competency and mastery of each skill. Documentation is on a sliding scale; 1 = aware, 2 = competent, 3 = master, and 4 = expert. To evaluate the student-employee's performance, the instructor-employer utilizes observations, student-self assessments and observations, written evaluations, memos, and reports. In addition, student-employees are given a series of pencil and paper evaluations - quizzes, tests, research projects, final exams. Through this multi-plex assessment structure the instructor-employer has quality information to objectively assess the student-employee's degree of mastery of the skill standards. Yet, the moment of truth comes for both the student and instructor when the student-employee goes into the world of the industry partners. To date the students from The Virtual Workplace have received enthusiastic assessments from their industry employers. This is high praise and a high endorsement for the way The Virtual Workplace prepares students for the real workplace.

Oh sure, there are a few student-employees who have difficulty adapting to this new "hands-on" learning style; nevertheless, during the first semester many of those same students eventually adapt and thus survive and flourish in The Virtual Workplace. According to the instructors, attrition in their programs is low compared to other programs.

With this concise overview of The Virtual Workplace as a foundation, it is appropriate to discuss in greater detail the primary components of The Virtual Workplace.

LOOKING BACKWARD

Integrating the National Skill Standards (NSS) into curriculum development dramatically changes the learning and teaching landscape. Teaching methods, student assessment and time based instruction are all radically transformed. Therefore, any contemplation of change should be thoughtfully and carefully considered. It would be helpful to understand how the four instructors went about the process of changing their respective programs - Automotive, BioTechnology, Electronics Engineering Technology, and Human Services - using the National Skill Standards as the foundation for their curriculum.

The Genesis Of Change

In the beginning the instructors search for the appropriate set of National Skill Standards written by business, industry, and educational leaders for 22 specific professions. Perusing the National Skill Standards one sees these are divided into cognitive - skills, knowledge, application, analysis, synthesis and affective - values, ethics, interpersonal skills. These skill standards are written in performance based terms precisely defining the specific job performance task expected of the learner.

Since the National Skill Standards offer an extensive listing of performance tasks, the instructors must carefully select the skill standards to include in their programs. Once this difficult selection process is completed the instructors are ready to begin the program's construction phase with the courses. Since course content is identified by those National Skill Standards the instructors selected, course development should be the easiest phase of this major overhaul. One of the most challenging aspects to this unique approach is the impact on methodology. At this moment questions are probably racing wildly through a prospective instructor's mind with one question looming above the others: can I use my present methods to implement the National Skill Standards? However begrudgingly, one must concede that drastic changes demand drastic measures. Continuing to use traditional methods will not as effectively nor as efficiently fulfill the performance requirements listed in the National Skill Standards as will a non-traditional methodology.

Dave Miller, Electronics Engineering Technology, Concord, speaking for the other project instructors concurs: "The traditional modes of instruction were unable to address the essential needs identified by the skills

standards." With a current of the Manufacturing Process running through the National Skill Standards, why not transform the classroom into a virtual workplace that replicates the world of work? In The Virtual Workplace the students are employees who perform the daily job routines and expectations by fulfilling the job's expectations as defined by the National Skill Standards. The classroom or laboratories are divided into work-stations where the student-employees work on specifically designed jobs or projects. It is a simulated world of work where the student-employees work in teams cooperatively collecting and analyzing data.

The Instructor's Role In Creating The Virtual Workplace

Meanwhile, the instructor's role in The Virtual Workplace is to prepare the various assignments and lessons for the respective job experiences. To help the student-employee understand the performance criteria the instructor builds a check list using the National Skill Standards for each job within the lesson. In addition to prepping and organizing courses, lessons and assignments predicated on the National Skill Standards, the instructor's role is also dramatically transformed. No longer is the instructor the central focus; in The Virtual Workplace the learner is the focus. There is a shift from the teaching paradigm to the learning paradigm. Multiple methods emphasizing the learner centeredness are constantly at the ready position waiting for the instructor to pick and choose the appropriate method at the most propitious moment to enhance the student's learning. Lecture, the traditional teaching staple, is available to acquaint and to introduce the student-employees to new lessons, materials, and lab experiences. Since the responsibility for learning is given to the student-employee, the instructor implements other methods such as: cooperative/collaborative learning, multi-media presentations, computerized instruction, individualized-self-paced instruction, role play, and simulations that actively engage students with learning. Consequently, in this learning center the instructor has multiple roles to complement the multiple methods: boss/employer, lecturer, facilitator, guide, counselor, and organizer. With the flair of the rapper's poetic phrases Dave Miller aptly describes the instructor and student's roles as synchronous: "For the teacher, the roles of sage on the stage, 'guide on the side,' and mentor in the center are augmented by the learner on the burner. For the students, the learner on the burner role is augmented by the sage on the stage, 'guide on the side', and mentor in the center." Teacher and student roles are fluid, constantly changing. It is Paulo Freire's, ("Pedagogy of The Oppressed"), learning world of students as teacher and teacher as student.

Assessing Student-Employee In The Virtual Workplace

Designed from the National Skill Standards, the performance charts developed for each lesson provide a checklist to chart, monitor, and track a student-employee's progress in mastering the performance skills. To determine student mastery in the learning centered experience, the instructor melds the traditional assessment tools with a series of non-traditional assessment tools. Yes, pencil and paper assessments are visible in The Virtual Workplace. Student-employees are quizzed and tested to assess knowledge. To further assess the student-employee's job performance, non-traditional assessment tools such as job reports, project designs, job reviews, memos, anecdotal records, and documentation of work performed are also used. Combining both the traditional and the non-traditional assessment instruments, a more accurate and comprehensive assessment of the student-employees' performance is secured.

Advantages To Teaching and Learning In The Virtual Workplace

In The Virtual Workplace where the learning paradigm, has supplanted the teaching paradigm, the student-employees from day one are immersed in the world of work cooperatively performing jobs where they will learn the essential skills of their chosen field. Upon graduating, the learner will advance from The Virtual Workplace to the real workplace with ease. Since the graduate has a work experience education where they mastered the skills outlined by the business/education community, this graduate is attractive to business as an employee. As a result, there are no surprises for either the newly hired employee or the employer. Both The Virtual Workplace and the real workplace share a common bond of job performance standards. Finally, what brings all this together and makes it a successful learning experience is The Virtual Workplace requires students to assume responsibility for their learning. As Jackie Griswold, Director Health and Human Services Program at Berlin, observes: "They know what they need to learn very specifically and are able to figure out what to do to learn the skills."

Surprises Abound For The Instructors

The four program instructors were surprised with the students' acceptance and adaptation to The Virtual Workplace. According to the instructors, most student-employees from the get-go performed their jobs as professionals.

During the curriculum development phase the faculty saw clearer than previously the interconnectedness of the courses in their respective programs. Consequently they came to appreciate the Gestalt.

Finally, the four faculty members were pleasantly surprised with the visible similarity of the education process method used by each of the four instructors to prepare students for the world of work; this is when they decided to name their learning world A Virtual Workplace. Their biggest surprise occurred when they noticed how similarly the four of them included the affective domain in their curriculum.

Oh, Come On; This Is Too Good To Be True!

Well, yes it is. The Virtual Workplace is not without blemishes. It is not the perfect learning world. Annoying problems constantly grate the instructors' nerve endings. The four instructors candidly admit to a variety of problems they confront daily.

* More time is required to work on this project
* More understanding by the colleges of what it means to change from a time based to a performance based learning is necessary
* Implications this change has on grading policies are unclear
* Skepticism and negativity from both administration and faculty toward change are unsettling
* Student skepticism and insecurity at first makes them uncomfortable with this new learning world.

Even with these problems, the four instructors defiantly stare directly into the tiger's eye, discovering ways to work around and over these obstacles. Their unbridled excitement and enthusiasm act as a protective shield deflecting the slings and arrows thrown at them. Their commitment to The Virtual Workplace is unwavering. They are true believers who patiently and at times impatiently await the time when administration and other faculty learn more about this brave new learning world.

Worthwhile change does not occur without pain, and at times the pain can be excruciating. The question then is: are you willing to suffer through the agony to eventually enjoy the ecstasy? If the answer is yes, then be aware that change operates on a five year plan. It takes approximately five years to debug, to revise, to edit the inherent glitches and flaws in any program change. Presently, these four instructors are in the third year of the five year plan. Through hard work these four instructors are speedily heading toward their original vision of The Virtual Workplace.

LOOKING AT THE PRESENT

"This is my proudest thing – lately!" enthused Biotechnology Professor Sonia Wallman. That quote reveals two essential outcomes of success-

ful implementation of voluntary National Skill Standards in performance based curricula. First and foremost the professor is proud of her work; secondly, the word "lately" emphasizes how her pride obviously includes change as her work evolves.

Successful pedagogy depends on those two awarenesses: pride in what has been achieved but expectation of new achievements. Successful assessment builds from connections of those awareness to student, faculty, and program outcomes.

The range of successes in the four very different programs – Advanced Automotive Technology, Biotechnology, Electronic-Systems Technology, and Human Services – and from their four lead faculty – George Dykstra, Sonia Wallman, David Miller, and Jackie Griswold who differ significantly in backgrounds and approaches – urge faculty in all disciplines to choose their road less taken that makes such a difference.

And what makes this difference? These four faculty have become so immersed in the totality of their work that evidence specifically about teaching and assessment can be gleaned only fragmentarily at this juncture of their work.

In Advanced Automotive Technology George Dykstra moved from "how we were going to have my students actually demonstrate their ability to do the work" (assessment) to beginning "to build the program and the curriculum around them" (pedagogy). Since it is the STUDENTS who "learn to develop those skills that are necessary to meet the skill standards," George sees the "moving towards a more student-centered, competency-based model" as the overall strength of the project. Pride in that achievement is mediated by needs to reshape the "neither large nor complex" curriculum around the student, taking "much more time than would normally transpire in a lecture/lab situation," going "outside, way outside, the normal classroom hours in order for students to complete their task." Separate lecture and lab hours "have merged together where students will spend the time necessary for the development of their skills in the area and in the ways that will serve them best."

Time is the problem for instructors as well. George is 75% complete in integrating this model into all the program courses. He hopes to extend the approach to other postsecondary and secondary programs. For both expansions he needs time. In addition development of materials, including multimedia, and development of enduring individual interactive relationships supporting the learning of each student require time. How to

achieve all this is an ongoing problem, but the response of employers who "are much happier with the quality of student that we are turning out to them" makes the problem one that George's whole college must own. Industry, which donates equipment, vehicles, and zone people to visit classes in operation – models fullness of commitment that is essential for even more success. An additional challenge is that subject matter, as the automobiles do, changes each year, becoming "a moving target" for the instructor who must review and change as needs change. In fact General Motors itself is shifting over to hands on, competency based work, so education is influencing the industry as much as industry influences education.

In Biotechnology Sonia Wallman "created" both "a real biotechnology work place centering real world biotechnology tools (A Virtual Workplace) "and" a logical series of biotechnology research protocols and manufacturing standard operating procedures that use these tools and serve to unveil the entire biotechnology content area to the student." The pedagogy is the creation.

One of the assessment standards for Biotechnology is that the student see "the relevance of their education and training to the workplace." The protocols include documentation of performance of skills acquired; a final exam assesses knowledge; memos from fellow students as well as observation and documentation by instructor assess attributes. New protocols have been and need to be added (the time and support factors again limit.) The Sloan Foundation supports this effort by funding conversion into a format that can be delivered over the Internet to learners in the workplace. The changing course and assessments reflect "a work in progress."

In Electronic Systems Engineering Technology David Miller not only divided skill standards into the 3 dominant groupings of skills, knowledge, and attributes but also identified the overlay between skill standards as strongest in the area of attributes, "an observation that is recognized as a keystone" of his project effort. He encouraged industry methods and assessment techniques such as "team and collaborative work, progress reports, proposals, memo, design reviews, and assessment by peers, self, and management against the industry performance based standards."

In Human Services Jackie Griswold entered the project "to validate my curriculum" "to know where changes might need to be made, and to develop a means of measuring student mastery of curriculum by using

methods to measure student performance of skills." Her task "was one of integrating the skill standards into the curriculum.. more unwieldy and difficult than starting with the standards and developing a curriculum on their basis." In Human Services assessment uses "a combination of instructor observation of student performance and student self observation and self reporting". Job descriptions and performance areas in the human services agencies are also being developed with skill standards, so the education again is influencing the industry. As a curriculum, Human Services have "more interconnectedness between courses and require more personal growth... there is a lot of assessment of character." In Human Services "all the skills were present in the existing curriculum, but there needed to be a more balanced distribution over the courses." Practicum courses moved to a new role as capstone courses, "opportunities for students to exhibit mastery of most, if not all, skills taught in the program." In the future skills standards will become "the basis for student evaluation and course grades." Such assessment will require increased use of out-of-class time.

In each of these very different programs students are moving from a course by course kind of learning to an integrated whole set of skill standards where the pattern of expected development is clearly stated. Students are actively looking at what they know, how they learn, and how they demonstrate mastery; learning for them becomes steps of the continuum that previously they became aware of only by looking backward. Not only faculty but also students are recognizing the different pathways to master, respecting the different choices, whatever road each travels.

More specifically though, in this "age of the standard," what are specific implications for pedagogy and assessment?

PEDAGOGY

Faculty does:

* behave enthusiastically and with commitment
* develop virtual workplace curriculum
* align standards with currently existing courses
* define logical sequence of skill development
* infuse skills into curriculum
* level skills
* correlate lab and lecture assignments
* develop activities

* search out appropriate materials for students for use in learning process
* write own training manual
* revise and review curricular material
* provide students with needed additional information including books, journals, vendor catalogs, videotapes, audio tapes, and the Internet as sources
* open labs to allow students greater access to instructor, tools, and equipment
* teach synchronously including texts, videos, Internet, video conferences, on site presentations, site visits, and tutorials
* link technical and academic courses
* design instructional activities on real life basis
* enable students to articulate skills of chosen profession
* enhance understanding and appreciation of profession
* help students to present skills to employers
* utilize state-of-the-art equipment found on the job
* expose students to the whole range of the work in experiential learning
* help students relate their work to the skills the work builds
* collaborate with industry on projects
* provide equipment, supplies, and industry-recognized protocols
* let students, working as individuals in teams, take over to organize and carry out the work
* level from 1) Awareness to 2) Competency then 3) Mastery and 4) Expertise, allowing flow back and forth as new elements are added
* revolve instructional methods around the best way to demonstrate skills and the best ways for students to demonstrate to the instructor skills learned
* enlist the help of students and rely on them to help devise instructional methods
* consult with students as to goals, reality of goals, and how to achieve them
* promote student-driven learning
* customize instruction for needs and characteristics of students
* respect and give credit for unique learning pathways of individual students

* develop more interactive, more student centered models for teaching
* coach
* group instruction with problem-solving activities
* use lecture for introductions (spend less time lecturing)
* engage in applied academics (case vignettes, role play, multimedia and computer simulations, scenarios, internships, site visits)
* act as facilitator/consultant to individuals/groups
* develop portfolios where students present skills developed

Students do:

* know what they need to learn and actively figure out what to do to learn skills
* get to work the minute they come in
* learn at own pace
* research what exists; try; apply
* learn all the jobs in the work
* interact with all aspects of a field

Business and industry does:

* give lectures and share their training background
* consult
* assess and give feedback
* provide access to equipment
* keep faculty current with industry methods
* introduce students to people in industry settings

ASSESSMENT

Assessment attempts to:

* be ongoing and constant
* be collaborative with roles for both students and faculty
* include student responses
* encourage students to ask questions freely
* provide more consistent, objective, and standardized means of granting credit for prior learning
* connect program skills to General Education
* incorporate industry practices as benchmarks in curriculum design
* require performance of tasks that require mastery of skills

* recycle student who is not having success back to learning activities (not to an F)
* experiment with barcoding all skill standards and students so, as what is seen is entered, matches occur
* use Internet as an electronic trail of leaning styles to teach which work best for each skill
* find ways to more concretely assess attainment of skills, knowledge, and attributes
* use, require, and document attributes in class
* communicate to students required strengths such as leadership, independent work, ability to learn on own, seeking out information, and progressing to succeed
* focus on what behaviors document skills, value, or attitudes
* require samples of work as proof of skill attainment
* include not only objective work but also "Select favorite piece of data" in lab notebooks
* use portfolios
* record what was done to successfully carry out each student activity
* generate a review form grouping functionally related sets of standards, augmented by correspondence, anecdotal notations, and documentation of work performed in order to have a comprehensive performance record of each student
* consult constantly about goals and how to achieve them
* help students express their changing goals
* assess how to assess
* seek feedback on courses
* replace grade with pride in performing work and internal reward

LOOKING FORWARD

As works in progress these four innovative programs are constantly scrutinized and evaluated by the four instructors. Courses and units are fine tuned, integration of skill standards with student assessment are studied and formulated, variations in the ways students acquire skills and improvement of documentation of student achievement are pursued. Dave Miller with an eye on the future summarizes, "The challenges ahead are primarily in creating changes in the management and the traditional expectations of the education industry to incorporate performance based learning informed by (the) National Skill Standards."

The integration of the National Skill Standards into these four programs - Human Services, Electronic System Engineering Technology, Advanced Automotive Technology and BioTechnology - has a profound educational fall- out for the instructors, their students, their colleges, and the community technical college system. The changes they implemented are groundbreaking. These are exemplary programs.

As Jackie Griswold enthusiastically testifies, "Using skills standards resulted in less lecturing, less conventional testing, more instructor time spent 'coaching'. There is an increased use of portfolios. Prep work for classes has increased as emphasis on ways of assessing and documenting acquisition of skills has increased. More responsibility has been given the students for devising ways of practicing and assessing skills."

George Dykstra, Laconia, elaborates, "...teaching methodologies are going to revolve around the necessity for students to become more involved in their education process."

Sonia Wallman, Stratham, adds "I do all the planning for the course, provide all the tools (equipment, supplies, wet ware) and industry recognized protocols and SOPs (Standard Operating Procedures). Then I let the students take over. They work as individuals in teams. They organize and carry out the work of the day. I take a back seat..."

Lastly, Dave Miller concludes, "Teaching under A Virtual Workplace /PBLs/NSS system involves significantly more learning and substantially less preaching than traditional methods. Since the problems are real they do not have (a) singular right answer. ...conceiving, evaluating, developing, assessing solutions to problems creates continuing changing activities and sets of knowledge and skills for success."

These four apostles of change, using the National Skill Standards as the foundation for their respective programs shed many of their traditional notions of teaching and learning and willingly dove into the chilly, uncharted waters of educational change. Furthermore, as the positive results from these changes multiplied, they unabashedly trumpeted the virtues of shifting from the teaching paradigm to the learning paradigm with the aim of converting other instructors to A Virtual Workplace method.

Having seen both sides of the teaching and learning paradigms, they are convinced beyond a reasonable doubt of the efficacy of the learning paradigm because of its effectiveness in teaching students to learn. When students are engaged in the learning paradigm, they become involved with the learning process which prepares them to master job-related skills,

expand their global awareness and perceive relevancy of learnings acquired in one course to those in other courses. Meanwhile, the instructors with their flexible pedagogical approach customize instruction to match student needs and characteristics. In A Virtual Workplace both students and instructors are empowered.

Implications For Faculty

Frequently when standards come from on high, the educational world suffers. Such a top down approach reinforces business as usual. Apparently the National Skill Standards defies this outlook and challenges the educational community to change. At least the four instructors in this study construed the skill standards this way and created the unique and useful Virtual Workplace where the instructor and students teach and learn through a manufacturing process. In this replicated world of work, students learn the ins and outs of their chosen careers with an on-the-job learning experience. The Virtual Workplace's multiple methodologies are employed to elevate student learning accompanied by multiple assessment tools – traditional and nontraditional – to assess students' learning progress. Not only do students learn skills, knowledge, analyses etc. but tney also learn how to work together, how to get along with each other to achieve their expected goals, and what values and ethics are appropriate for both the world of work and beyond. These exemplary programs are models for change. There is much we can learn from the four instructors' adventures into the educational world of innovation predicated on the National Skill Standards.

Commendations And Recommendations

At this time it is appropriate to offer commendations and recommendations that arise from the study of the four New Hampshire Community Technical College System innovative programs based on the National Skill Standards.

Commendations

* The shift from a teaching paradigm to a learning paradigm requires more student responsibility for their learning
* Utilization of multiple primary methods helps students learn
* Transformation of the classroom/lab into a virtual workplace offers on the job learning experience
* Programs are focused on meeting student needs

* The project implements performance-based learning in diverse program areas
* College standards are defined on an industry baseline
* Interacting among peers from different programs is ongoing
* Peers adapt to unforeseen and foreseen glitches and recognize the need to fix these glitches
* Collaboration across disciplines is being modeled
* Similarities across programs, not just differences, are identified
* Publication in Tech Newz, presentation to secondary, post-secondary and to Pedagogy Symposium faculty promote wider involvement from other technical and academic areas
* Communication across system within Human Services faculty has pulled in other campuses where faculty are willing to try this approach
* Project responds to need to identify and integrate prior work and life experience
* Project responds to perception that so-called soft outcomes aren't measurable, eg attitudes and values, and integrates these with more traditionally measurable outcomes
* Virtual Workplace transforms classroom from merely a location into a learning tool itself
* Advanced Automotive Technology uses national skill standards as a tool of communication with General Education faculty, high school faculty, and employers
* Electronic Systems Engineering Technology begins student experience as workplace by not enrolling in a course but applying for a position
* Human Services calls national skills into play through role playing, and in mini dramas that illustrate work activities and scenarios
* Pedagogy becomes performance based when skill standards are written for performance
* Individualization is enhanced through skill standards
* Faculty who developed skill standards have better ability to implement them, will be more committed to sharing them
* Employers are excited about shared benchmarks and might more willingly participate in designing how those benchmarks could best be achieved; the partnership would deepen

- Assessing students properly requires more than traditional methods; therefore the documentation of assessment itself is labor intensive
- Learning sites in both classroom and workplace can be integrated
- Courses integrate skills into a hierarchy recognizable and accessible to learners
- Faculty are enthusiastic and committed
- Students, who some worried would only learn well in the traditional lab/lecture situation, began to work well with this system of learning
- Students are able to PERFORM the work
- Both traditional and non-traditional assessment tools are utilized
- Communication between college and the industry is ongoing
- Use of skill standards gives educators a more concrete understanding of the needs of industry
- Independent learners are being created
- Creating lifelong learners is a goal being worked toward
- Biotech published in-house lab material (with former students)
- Programs are sought statewide by both educators and employers
- Students know what is expected
- Students with limited backgrounds are able to learn difficult subject matter
- Faculty has become more involved with industries that utilize faculty's discipline
- Students have a clearer idea of what they should know and what they do know
- Graduates of program can be marketed to the industry better, and students can market themselves better
- Students assume more responsibility for their learning
- Students see more wholes organically
- Students recognize universality of skill standards
- Sonia Wallman has the ONLY biotech site on the glob – http://biotech.tec.nh.us
- Commissioner Rafn has always evidenced strong support as have Keith Bird and Ann Weddleton
- Project has expanded and accelerated in two years far beyond what was expected for completion results three years
- Innovation is systematic
- Transition for students from A Virtual Workplace into the business and industry workplace is smoother

Recommendations

- Provide data showing more learning occurs in the learning paradigm model versus the teaching paradigm model
- Implications that only faculty could recognize as they work through their teaching must not get lost (ie not reported) because faculty are doing tasks which could be done by support staff
- Face time concerns, from how long students take to master learning to change from standard semester and weekly contact hours; revolve time around what learning requires
- If performance based learning is a System priority, the System must more visibly support lead faculty practitioners, ie. dollars for equipment, local technical assistance, secretaries, work study, assistants, assessments, and tutors.
- Document aspects of implementation more completely
- Document student assessment/evaluation of the methodology
- Increase level of commitment of Presidents and Vice Presidents of Academic Affairs in direct support of faculty; insure that presidential support is clearly visible to rest of campus and to workers of business and industry
- Address ongoing need for continuing education to keep faculty current in their fields
- Appropriately fund maintenance of well-equipped labs and facilities
- Fund appropriate staff development
- Send lead faculty out to give workshops to other System faculty; time must be appropriated for such work (not be another add-on)
- Facilitate articulation with high schools and four year college
- Integrate core competencies; that core might lead to clearer seeing of commonalities
- Establish a "Partnership" with General Education
- Integrate program skill standards with General Education
- Track through pre and post testing of some kind
- Increase the variety of ways students can master skills, and document the mastery
- Implement Alumni assessment of virtual workplace pedagogy
- Implement employer assessment of NHCTC virtual workplace graduates versus students who graduated from a traditional lecture/lab

Questions That Remain

- Since skill standards are silent on HOW standards should be learned, what are the parameters for successful learning?
- How do instructors keep pace with changing standards? How do they learn what to teach?
- What in this 'project' most helped to improve student learning?
- What most consistently crosses all four programs?
- What kinds of connections are students making? How are faculty aware of student assessments of connections?
- What benchmarks are the same or similar?
- How do General Education skills implied in the work of a skilled technician gain focus?
- How should high schools best prepare the way to Virtual Workplace programs?
- If labor intensive documenting and assessing student progress slows spread of reforms, how can this slowing become a benefit?
- What should be replicated? Why?
- How will unique skills performed or unique work achieved be recognized (ie. outside the skills "box")?
- What are the most appropriate spinoffs to other areas?
- How will the core competencies be integrated?
- Are attributes that crossover in the four programs a new element of a core?
- How do student views of learning impact change?
- What is the source of money for updating equipment and sustaining expensive technology?
- How can faculty be supported in balancing technology, contact with industry, preparation, pedagogy, funding, teaching, assessing, etc.?
- What will be the role of traditional grading systems?
- How will individuals hold up under the "work harder" ethic?
- How will program and academic skill standards be integrated and/or related?
- How can recognition of likenesses in processes of instruction and assessment as well as of attributes be built into other learning areas?
- How will college policies change to support competency based assessment?

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Appendices

Appendix A
The Virtual Workplace Work Plan

1. History of Project
2. Context of the Project (National Movement, Pedagogy, System initiatives)
3. Definition of the Project Process
   - Who was involved?
   - What they did
   - Methodology: Instruction and Assessment
   - Integration of skill standards with prior methods and materials
   - Challenges the skill standards presents
5. The Results of the Project
   - Students' responses
   - Instructors' responses
6. Interpretation/Analysis
7. Implications for other faculty/System

How to

- collect data .. compile information
- the history
- findings in terms of PBLOs, teaching and assessment
- analysis of findings: National Skill Standards on teaching and assessment (audience/faculty)
- student assessment of the projects
- Monograph Report compilation: interviews; curricula materials; assessment models
- Article "Pedagogy Journal"
  Impact on Teaching and Assessment

Deliverables

1. Work Plan
2. Final Report

Timeline

June 14	=	Work Plan
June 14	=	Copies of faculty materials assembled and sent
June 30	=	Questionnaire/Interviews completed materials with commentary returned
July 20	=	Rough Draft
August 19	=	Final Draft

Appendix B
The Virtual Workplace

Questionnaire

1. *How did you get involved in this project?*
2. *How did you apply the National Skill Standards to your instruction?*
3. *How did you apply the National Skill Standards for your assessment?*
4. *What strengths do you see coming from this project?*
5. *What surprised you?*
6. *What problems did you encounter?*
7. *How did you cope with the problems?*
8. *What changes have you made?*
9. *What changes are you planning to make?*
10. *What benefits would faculty in other academic and technical disciplines discover if they use National Skill Standards for their own fields?*
11. *What differences did it make in your teaching?*
12. *Is this methodology the most effective vehicle to deliver information to your students? Why or why not?*
13. *List the documentation you possess that supports your responses.*
14. *Additional comments:*

Appendix C
The Virtual Workplace

Questionnaire

George Dykstra

1. *How did you get involved in this project?*
   I became involved in this project after talking with Dave Ronco, one of the original writers of the grant. I have an interest in the development of quality education for our postsecondary system. I thought this was an opportunity to further these goals.

2. *How did you apply the National Skill Standards to your instruction?*
   When we got involved with this project, we sat down and took a look at how we were going to have our students actually demonstrate their ability to do the work. Listed below is an example of tasks which students must accomplish in order for them to develop a thorough understanding of the electrical concepts and components used in current production automobiles.

You can expect your student to have knowledge and be able to do the following task as noted in the GM Automotive Electricity Program.

TASK	NO SUPERVISION REQUIRED	SOME SUPERVISION REQUIRED	DIRECT SUPERVISION REQUIRED
Work safely doing Electrical Task			
Understand basic Electrical Concepts			
Use Digital and Analogy Meters			
Find Shorts, opens, grounds, etc.			
Repair and solder electrical wiring			
Read Section 8A Wiring Diagrams			
Circuits Covered			
Power Distribution			
Fuse Block Details			
Horn Circuit			
Heater w/AC			
Instrument Panel Gages & Indicator Lights			
Wiper Washers			
Headlamps			
Turn/Hazard/Front Marker/Front Park			
Tail/Stop/Rear Marker/License			

TASK	NO SUPERVISION REQUIRED	SOME SUPERVISION REQUIRED	DIRECT SUPERVISION REQUIRED
Interior Lights			
Power Windows			
Power Locks			
R & R Instrument Cluster			
R & R Light Bulbs			
R & R Head Light Switch			
Find Electrical Components & Test Circuits			

Once we arrived at the skills and goals (based on the previous tasks) that we wanted to see our students demonstrate, we then began to build the program and the curriculum around them. Much of this, of course, has an effect on teaching methodology as well as on curriculum structure and how it is presented.

3. *How did you apply the National Skill Standards for your assessment?*
During the course, we have an assessment process that is ongoing where we require students to actually complete tasks in the learning activities in the different modules. Students learn to develop those skills that are necessary to meet the skill standards. The assessment does not just include a final evaluation. However, a final evaluation comprised of worksheets, direct observations and a General Motors test may be one or two days in length in order for students to demonstrate their skills.

4. *What strengths do you see coming from this project?*
I believe that the overall strength of this project is getting away from the traditional education model and moving towards a more student-centered, competency-based model. This will allow us to be much more competitive in providing and producing students with education that develops them into the most skillful workers possible.

5. *What surprised you?*
I believe the greatest surprise to me was the resistance of other instructors to the development of this model. Also, what surprised me was that students who we felt would only learn well in the traditional lab/lecture situation began to like and to work well with this system of learning.

6. *What problems did you encounter?*
Here again, the resistance of some instructors to begin to incorporate the model into their curriculums. Time was also a major problem. We deal with sessions, not semesters. A student has 35 contact hours when he/she is not on co-op. Something else that is interesting is that students take a subject like English over a twelve week period, not their usual 8 week session. Thus, time in a competency-based system revolves around the student not around the instructor. Another feature is that the curriculum is neither large nor complex. It can however take much more time than would normally transpire in a lecture/lab situation.

7. *How did you cope with the problems?*
We have had to go outside, way outside, the normal classroom hours in order for students to complete their task. The Automotive program has a high number of contact hours. Students will still be working late in the afternoons; 5, 6, 7 o'clock, in order to complete the requirements for the program.

8. *What changes have you made?*
We have made major changers in the way we have developed our curriculum to present our educational material. We have moved from being instructor-centered to being student-centered. We have also changed the old-fashioned concept of students will spend the time necessary for the development of their skills in the area and in the ways that will serve them best.

9. *What changes are you planning to make?*
We plan to integrate this model into all of our courses. Currently, we are about 75% complete and we will be moving to 100% completion by the next year. Our goal is to turn out a better product. We also hope to extend the concept of contextual competency-based learning with other schools in the New Hampshire Community Technical College System and with other high schools around the state of New Hampshire.

10. *What benefits would faculty in other academic and technical disciplines discover if they use National Skill Standards in their own fields?*
They would find that their students regardless of their academic background and other skills would begin to develop a deeper apprecia-

tion for the subject matter which they are teaching. They will begin to notice that students really learn and are able to apply what they had learned in the classroom.

11. *What differences did it make in your teaching?*
As was mentioned earlier, teaching methodologies are going to revolve around the necessity for students to become more involved in their educational process. The students will take on a different teacher/student relationship, the one currently used in the lecture/lab concepts.

12. *Is this methodology the most effective vehicle to deliver information to your students? Why or why not?*
I believe at this point it is one of the most effective ways to deliver material to students. It is dependent, however on a lot of instructional materials, both instructor developed and developed outside of the classroom. Because of the way our students learn and because of their background in technology multimedia, individually used multimedia is a critical part of this process as well.

13. *List the documentation you possess that supports your responses.*
Each year, we survey the employers of our students who have completed our program and we are finding that our employers are much happier with the quality of student that we are turning out to them. This is done through surveys which are available for examination.

The Virtual Workplace Questionnaire

Jackie Griswold

1. *How did you get involved in this project?*
I was asked by Keith Bird to consider being involved with the project. I saw it as an opportunity to work with people involved in a project that was national in scale. I also saw it as an opportunity to not only make a contribution to the FIPSE project but also to validate my curriculum at Berlin, enable me to know where changes might need to be made, and to develop a means of measuring student mastery of curriculum by using methods to measure student performance of skills.

2. *How did you apply the National Skill Standards to your instruction?*
Since the Berlin Human Services curriculum was already developed, the task was one of integrating the skills standards into the curriculum. This is, I think, more unwieldy and difficult than starting with the standards and developing a curriculum on their basis.

   The use of the skill standards made the choice of instructional methods revolve around what seemed the best way to demonstrate skills and the best way for students to demonstrate to the instructor the skills learned. From the beginning I enlisted the help of the students and relied on them to help devise instructional methods best suited to skills. It should be noted that no less important are the attributes. In fact, an argument can be made that attributes (values and virtues) are more directly important in human services and present greater challenges.

3. *How did you apply the National Skill Standards for your assessment?*
Students have to demonstrate a required level of competency for each child. We use a combination of instructor observation of student performance and student self observation and self reporting. Our department does not yet use the skills standards for determining grades. We are still integrating skills standards into the curriculum and use of the skills standards is still what I would call experimental. We are a couple of years away from using skill standards to determine course grades.

4. *What strengths do you see coming from this project?*
   a) Emphasis on practical applications of knowledge is increasing. More real life experiences are becoming the basis for designing instructional activities.
   b) Students have a clearer idea of what they should know and what they do know.
   c) The graduates of the program can be marketed to the industry better and students can market themselves better.
   d) The industry in the area (human services agencies) are using the skill standards to develop job descriptions and performance evaluations.
   e) Generally, students are assuming more responsibility for their learning. They know what they need to learn very specifically and are able to figure out what to do to learn these skills.

5. *What surprised you?*

What surprised me most was the similarities between the four FIPSE projects. I initially believed that Human Services project would be remarkably different from the others. It is different in content, but the process is similar (the process of instruction and assessment) and equally remarkable, the attributes are similar. This came as a big surprise.

On the other hand, Human Services seems, as a curriculum, to have more interconnectedness between courses and require more personal growth. This became clear as I worked with the skills standards. Human services each requires greatest reliance on personal, characterological attributes and virtues. In the human services curriculum there is a lot of assessment of character.

6. *What problems did you encounter*

Two main problems:

a) More time was and is needed to work on this project than the College was and is prepared to allow.
b) Going from time based to competency based assessment/evaluation means we need to change certain policies around grades and time limits. This is more of an anticipated problem.

7. *How did you cope with the problems?*

Since I think this project so worthwhile, I simply spent as much of my own time as was needed on it. It has been very difficult many times doing this.

Organizational policies/procedures that may be obstacles to implementation of skills standard will need organizational responses.

8. *What changes have you made?*

Course modifications were made as a result of the use of skills standards. Some skills were over represented in courses, other under represented. Interestingly, all the skills were present in the existing curriculum, but there needed to be a more balanced distribution over the courses.

Using the skills standards has resulted in practicum courses being seen as capstone courses that should be taken only after students have acquired most all the skills. While previously students would take

the practicum courses earlier, using the skills standards makes clear that these courses should be opportunities for student to exhibit mastery of most, if not all, skills taught in the program.

9. *What changes are you planning to make?*
   a) To make the skills standards the basis for student evaluation and course grades.
   b) Increase variety of ways students can acquire the skills and document that they have acquired them.

10. *What benefits would faculty in other academic and technical disciplines discover if they use National Skill Standards for their own fields?*
   a) Validation of curricula
   b) Students get a greater sense of real-life work
   c) Closer industry involvement with program and curriculum development
   d) Used in arts and sciences it will make general education courses' relevancy clearer to students.

11. *What differences did it make in your teaching?*
   Using skill standards resulted in less lecturing, less conventional testing, more instructor time spent "coaching". There is an increased use of portfolios. Prep work for classes has increased as emphasis on ways of assessing and documenting acquisition of skills has increased. More responsibility has been given the student for devising ways of practicing and assessing skills. It has also increased the use of out-of-class time for coaching and assessment.

12. *Is this methodology the most effective vehicle to deliver information to your students? Why or why not?*
   "I think so - yes." It seems to be the best way a) to get students involved in the learning process, b) to master job-related skills, c) to enable students to see things more globally/organically – students are better able to see relevancy of learnings acquired in one course to those in other courses d) several different processes can be used to learn and to document skills – makes instruction more capable of being "customized" for needs and characteristics of students.

13. *List the documentation you possess that supports your responses.*
See the last year end FIPSE report (Ann Weddleton has all the "stuff").

14. *Additional comments:*
None

The Virtual Workplace Questionnaire

Dave Miller

1. *How did you get involved in this project?*
The original four sites in the New Hampshire Community Technical College System for involvement with this project included a manufacturing discipline group from the Nashua campus. The Nashua group was unable to participate at the time when the project was funded and the start-up activities were undertaken. Contact between the Commissioner and NHTI President Dave Larrabee established that Dave Miller from the Electronic Engineering Technology department at NHTI had an interest in educational reform in the engineering technology curriculum areas as evidenced by his preparation of an NSF proposal (Electronic Design Automation and Fabrication Laboratory (EDAFL). An invitation was extended and accepted to allow me to participate in the FIPSE project.

2. *How did you apply the National Skill Standards to your instruction?*
The skill standards were analyzed to identify the potential impact on the existing curriculum. The two sets of skill standards that were identified as being pertinent to the EET curriculum were the Electronic Industry Foundation's (EIF) "Raising the Standard – Electronics Technician Skills for Today and Tomorrow" and the American Electronics Association's (AEA) "Setting the Standard: A Handbook on Skill Standards for the High-Tech Industry."

   It was recognized that each of the sets of skill standards can be divided into three dominant groupings – skills, knowledge, and attributes. The skills area involves the abilities necessary to perform specific professional tasks such as using equipment or industry procedures. The knowledge grouping concerns the theoretical grounding of the field. Attributes identify the personal characteristics such as work ethic and interpersonal skills that are necessary for success

in the workplace. It is natural that the overlap between the identified sets of skills standards is strongest in the area of attributes, an observation that is recognized as a keystone of the NHTI FIPSE project effort.

The educational community has an established record in handling the skills and knowledge categories. The more complex and interrelated attribute area has not been very successfully incorporated into traditional educational pedagogy. This was highlighted by the observation that many "help wanted" advertisements require a particular degree (traditional schooling) along with a period of professional experience (industry schooling). The question that begged for an answer was "What do they get during job experience that they do not get in school?"

A review of the differences between the workplace and educational environments revealed a startling pattern:

* workplace knowledge was more dynamic in nature – a basic assumption is that necessary knowledge is acquired on an as-needed basis in industry as opposed to the traditional canonical knowledge set established for education.
* attributes associated with teamwork and collaboration are essential for success in the workplace as contrasted with the traditionally isolated nature of the student in school.
* school work is traditionally decomposed into discrete modules where workplace activities involve the integration of a variety of skills, knowledge, and attributes.
* the traditional school environment does not lend itself to providing industry strength experiences.

It became evident that traditional modes of instruction were unable to address the essential needs identified by skills standards. An effort to incorporate more industry-like methods resulted in the idea of the "Virtual Workplace" (VW). In the VW, the industry methods and assessment techniques replace traditional educational methods. Isolated work, quizzes, exams, homework, lab reports, oral presentations and teacher driven assessments are replaced by team and collaborative work, progress reports, proposals, memos, design reviews, and assessment by peers, self, and management against the industry performance based skills standards.

3. *How do you apply the National Skill Standards for your assessment?*
The initial approach was to utilize the EIF standards for self and management review. A review form was generated that grouped the standards into functionally related sets that were used to evaluate student performance of each student. It was a trivial task to generate the traditional "A to F" type grades from these records. However, this experience has illustrated the relative uselessness of this grading system.

4. *What strengths do you see coming from this project?*
The future can be a scary thing to face. Business and industry have been scrambling to keep up with the exponential change in the global marketplace. The education industry has generally remained mired in the "agrarian model" of education where skills and knowledge are catalogued, maintained, and conveyed as dogma to the students.

   The success associated with the initial implementation of new education paradigms drawn from industry techniques has made the future of the education industry both more comfortable and more exciting. After working in a VW teaching environment, it will be difficult, if not impossible, to return to a traditional classroom environment. This is a good thing.

5. *What surprised you?*
The greatest surprise was the quick adaptation and acceptance on the part of the students. In more than one case, students who were not thought of as being particularly gifted performed in the VW environment in an exceptionally professional manner. The "grade game" was replaced by the pride in performing real work, and the greatest reward was from an internal source rather than the a"grade the teacher gave me."

6. *What problems did you encounter?*
Skepticism by administration and peers was the greatest external source of problems. Problems caused by inexperience with this experimental pedagogy are easily addressed by examining the issues identified by the initial experiences in the VW environment.

7. *How did you cope with the problems?*
Thick skin combined with the belief that "If you build it, they will come."

8. *What changes have you made? (I assume you mean in terms of my philosophy of education – the details of the pedagogical changes are covered in previous questions.)*
   The cumulative effect of the changes has resulted in a radically new perception of the role of the education industry in the rapidly changing world. This role is based on the recognition that education is an industry. As such, it has products, customer, and suppliers. Only by acknowledging this fact can the education industry work to produce the quality and quantity of products that the customers demand as well as work with the suppliers to recruit students into a system that can ensure their professional success.

9. *What changes are you planning to make?*
   The challenges ahead are primarily in creating the changes in the management and traditional expectations of the education industry to incorporate performance based learning informed by National Skill Standards. This cannot be done in a "band-aid" manner – picking and choosing the isolated points that create a cosmetic illusion of pedagogical change. Rather, it requires a systematic approach that harbors no "sacred cows" to develop a successful implementation of an education company that can prove the new paradigm of the next generation of education industry.

10. *What benefits would faculty in other academic and technical disciplines discover if they use National Skill Standards for their own fields?*
    The faculty who would successfully base their teaching on NSS would find that they would become more involved with the industries that utilize their disciplines. Additionally, they would think less in terms of the "silo" (vertical, isolated, no windows, fermentation buildings for single subjects) department model and more in terms of an integrated model of subject areas.

    The successful faculty would work harder, play more, and have more fun than they every thought possible. The VW/PBL/NSS approach requires more from, and returns more to all of the participants.

11. *What differences did it make in your teaching?*
    Teaching under a VW/PBL/NSS system involves significantly more learning and substantially less preaching than traditional methods.

Since the problems are real, they do not have singular "right answers." Thus, the method of approaching a problem is far removed from the "plug and chug" or "regurgitate" uni-polar exercises that teachers have used for centuries. Conceiving, evaluating, developing, and assessing solutions to problems creates continuously changing activities and sets of knowledge and skills for success. The common thread to each experience is that the attributes and processes are emphasized, with the demand on all participants to contribute with the best of their abilities for the success of all. For the teacher, the roles of the "sage on the stage," "guide on the side," and "mentor in the center" are augmented by the "learner on the burner." For the students, the "learner on the burner" role is augmented by the "sage on the stage," "guide on the side," and "mentor in the center."

12. *Is this methodology the most effective vehicle to deliver information to your students? Why or why not?*
    a) No.
    b) Delivering information is a residue from the agrarian model of education. Information is no longer a linearly quantifiable product that must be impressed on the students to qualify them for entry to the real world. The very nature of knowledge has changed. In years gone by, everything that a person would need to know could be learned from them. The basic knowledge required for living changed little from generation to generation. Today, the knowledge necessary for success in a profession changes so rapidly that, in many fields, it can be measured in half-lives of three to five years. Consider the computer field; in just three years, the World Wide Web has emerged from the laboratory to dominate the activities of computer professionals. It is projected that in a few short years, the current HTML based Web technology will be replaced by the spin-offs from today's Java/JavaScript/SGML/VRML/CGI leading edge Web techniques. In such a rapidly changing field, is it possible to identify a linear list of information that must be mastered in time to avoid obsolescence? (Answer: Obviously not!)

Instead, the process of acquiring knowledge and skills as necessary to solve rapidly changing problems is the key for success. The process becomes the cornerstone of learning success. The VW utilizes

real problems to exercise the process to develop the skills identified in the skill standards. This approach not only accommodates, but actually requires that those "difficult to identify" attributes such as responsibility, self-learner, team worker, and communicator be incorporated and assessed in the learning environment. Thus, the new paradigm is a revolutionary rather than an evolutionary change.

13. *List the documentation that you possess that supports your responses.* For example??? (What do I look like, the White House? ;-) Perhaps Ann has the records that you would need as part of the FIPSE progress reports.

14. *Additional comments:*
Radical, eh?

The Virtual Workplace Questionnaire

Sonia Wallman

1. *How did you get involved in this project?*
It was through my involvement with the Bioscience Industry Skill Standards (I became a technical advisor to the Education Development Center (EDC) Bioscience Industry Skills Standards project early in 1993.). Also, in July 1994 I received an Advanced Technology Education (ATE) grant from the National Science Foundation (NSF) to build a lab and create the curriculum for Biotechnology technician education and training. It was a natural leap to create the curriculum to educate and train biotechnology technicians with the Bioscience Skill Standards in mind (These skill standards were created for technical workers in pharmaceutical companies, biotechnology companies, and clinical laboratories). Later I also became technical advisor to the Agricultural Skills Standards project. Finally, I am a member of the Content Selection Task Force for the SciTeK Project of High Schools and in this project I am also looking at the Skill Standards for the Chemical Process and Environmental industries.

2. *How did you apply the National Skill Standards to your instruction?*
Informed by my involvement with the Bioscience Industry Skill Standards project, I created a real biotechnology workplace contain-

ing real world biotechnology tools (the Virtual Workplace). Then I created a logical series of biotechnology research protocols and manufacturing standard operating procedures that use these tools and serve to unveil the entire biotechnology content area to the student. The steps in each protocol or SOP were listed and the appropriate Bioscience Industry Skill Standard were identified for these protocols and SOP's. The student receives a copy of the spread sheet created for this purpose so the student can see the relevance of their education and training to the workplace.

Industry comes in to deliver some of the knowledge base of "Biotech Experience I: Research" and most of the knowledge base of "Biotech Experience II: Manufacturing". Industry representatives also are asked to give an overview of their company and their own background. For instance, one of the industry representatives (from Biogen) started as a young graduate of a 2 year program about 10 years ago, and she is now Manager of Manufacturing.

Students are made aware of the attributes necessary to succeed in the field, and they develop these attributes during the course.

3. *How did you apply the National Skill Standards for your assessment?*
As the student proceeds through a biotechnology protocol or SOP, there are places where documentation of the skills is required. I look at each student's documentation to determine if the student acquired the skills. The skill documentation is graded on a 5 point scale with 0=not aware, 1=aware, 2=competent, 3=master, and 4=expert.

Assessment of knowledge comes about through a final exam.

Assessment of attributes comes about through memos from fellow students or from observation and documentation by the instructor(s).

4. *What strengths do you see coming from this project?*
The skill standards create a believable structure for competency based learning; in my case a hands-on approach that encourages students to become proficient in the skills of biotechnology. Learning the skills creates a natural platform off of which to dive into the knowledge base behind the skill; students pick up the attributes as they go along.

5. *What surprised you?*
What surprised me is that the skills assessment piece was so easily accomplished. At first assessment of skills seemed mind boggling for there were so many skills. However, I soon learned that if it takes a series of skills to perform a protocol or SOP and the documentation looks good that means the student has correctly performed the skills. The easiest illustration of this is a protocol or SOP involving gel electrophoresis. This protocol takes the better part of a 5 hour class period and involves a myriad of skills. The end result of this protocol is a photograph of the gel. If the photograph looks good (I like to say, "publishable") then the student must have carried out the steps in the protocol.

Another big surprise is that the industry skill standards appear to be cross functional, i.e. as a student trains to become a biotechnology technician, these skills are often identical to those skills needed to become a chemical process technician, a hazardous materials technician, etc.

6. *What problems did you encounter?*
The two biotechnology cornerstone (some call them capstone) courses that I developed with the Bioscience skill Standards in mind, "Biotechnology Experience I: Research" and "Biotechnology Experience II: Manufacturing", are skills oriented and student driven. I find some students have no idea how to behave in such an environment. These are the "old time" students who are looking to be fed and led. In our "virtual workplace" students are expected to know what to do whether it be wash the glassware, make a buffer or media, or assemble the tools needed for the current protocol or SOP. Some students are not comfortable with this format.

7. *How did you cope with the problems?*
Give them time to adapt to this new way of learning. In one case it took the student till the end of the second cornerstone course to "get it".

8. *What changes have you made?*
I have not made any substantive changes since the beginning of the course except to add a protocol or SOP here and there to make the flow of skills and information more and more logical and representative of industry. One example of this is the addition of a series of

protocols (Protocols X-XVI of the Biotechnology Research Protocols) that involve the extraction of mRNA from CHO cells containing recombinant human tPA, the reverse transcription of mRNA into cDNA, the ligiation of cDNA molecules into vectors, the transformation of bacterial cells with these vectors, the screening of resultant colonies for tPA cDNA, and the amplification, isolation and sequencing of tPA cDNA. This series of protocols was worked out with the help of John Wold, a former student that became a summer technician in 1995. This series of protocols has been used to demonstrate current biotechnology research strategies to a class of UNH seniors in Chemical Engineering.

With the help of another former student and a UNH Chemical Engineering graduate who is a Biochemistry graduate student, some of the Biotechnology Manufacturing SOP's were refined and developed. These include SOP IX (Process Controlled Fed-Batch Fermentation of Recombinant HSA Secreting *Pichia pastoris* by Rachel Kroe and Sonia Wallman) and SOP V and VIII (Ion Exchange Chromatography of tPA and Final Affinity Chromatography/Isolation of tPA by Ellen Eckerson and Sonia Wallman).

9. *What changes are you planning to make?*

I need to refine and develop two additional Manufacturing SOP's. They are SOP VII and SOP X (Tangential Flow and Diafiltration of HSA and Isolation and Purification of HSA). I am planning to finish these up this summer with the help of Ellen Eckerson.

I have another grant, a Sloan Foundation grant to convert "Biotechnology Experience II: Manufacturing" into a format that can be delivered to technicians-in-industry over the Internet via the Biotechnology Center's HomePage. I am very much looking forward to allowing the technicians-in-training at the virtual biotechnology workplace at Pease access to these materials. For people who are insecure about what it is they have to do, they can practice the SOP of the day using the computerized version of the module that will be available on the Internet. These additions will be implemented for Biotechnology Manufacturing during the Fall semester.

I am hoping I can get additional funding from the Sloan Foundation to repeat this process for "Biotechnology Experience I: Research".

10. *What benefits would faculty in other academic and technical disciplines discover if they use National Skill Standards for their own fields?*

It depends on how they use them. This methodology that we have developed to create A Virtual Workplace from which the skill standards naturally flow may be unique. In general, however, no matter how the skill standards are used they give educators a more concrete understanding of the needs of industry. That allows a teacher to craft a learning experience that has more relevance to industry.

For example, in most college science classes students would learn on paper how to make a 100mM solution of potassium chloride. If the class has a lab and the lab exercise calls for 100mM potassium chloride, the teaching assistant or professor would make up the solution before class. If these students became employed in Biotechnology research one of the first things that they would be required to do is to make such a solution. My experience is that the average student trained in this way cannot properly create such a solution. In the virtual workplace all solutions are prepared by the students. Which student would you rather hire, the student that can make a solution on paper or the student who can actually prepare the solution?

11. *What differences did it make in your teaching?*

I do all the planing for the course, provide all of the tools (equipment, supplies, wet ware) and industry recognized protocols and SOP's. Then I let the students take over. They work as individuals in teams. They organize and carry out the work of the day. I take a back seat, enabling the students to learn the skills, knowledge and attributes of their field.

Also, the teaching and independent student learning center or "synergy center" provides students with any additional information they might need including information from books, journals, vendor catalogs, video tapes, audio tapes, and the Internet.

This creates independent learners.

12. *Is this methodology the most effective vehicle to deliver information to your students? Why or why not?*

I think this methodology is most effective in giving my students the biotechnology knowledge base and allows them to develop bio-

technology skills and attributes as well. This method of teaching enables students to interact with all aspects of the biotechnology field and gives them first hand knowledge of how to get around in the field. This creates an independent and life-long learner. The best analogy to this process that I know of is home schooling where children retain the joy of learning since they have a far greater influence on the direction that their leaning process will take. Of course this is also what happens at the workplace.

13. *List the documentation you possess that supports your responses.*
The Biotechnology Information Package contains most of the documents including the following: Introduction, The Physical Facility Creates a "Virtual Workplace", Layout of the "Virtual Workplace", Biotechnology "Tools of the Trade", Biotechnology Associate in Science, Diploma and Certificate Programs, The Cornerstone Courses: Biotechnology Experience I: Research and Biotechnology Experience II: Manufacturing-Syllabus and Lecture Schedules, and the table of contents from Biotechnology Research Protocols and Manufacturing Standard Operating Procedures: A Manual for Technicians-in-Training.

    Also available are the skills assessment sheet and student assessment database. The latter summarizes, for each student, the acquisition of skills, knowledge and attributes.

    Finally, also available around August will be the "final" version of the above mentioned manual.

14. *Additional comments:*
Please visit.

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